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OBSERVATIONS ON SERUM FROM ABORIGINES IN THE NORTHERN TERRITORY OF AUSTRALIA: I. ANTIBODIES AGAINST LANSING (TYPE II) POLIOMYELITIS VIRUS.

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(With the technical assistance of B. W. Moore).

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IT is widely held by those who have intimate knowledge of the Australian aborigines that paralytic poliomyelitis is very rare among them, and it has been particularly noted that when an epidemic has occurred among the white men in areas where aborigines are numerous, the aborigines are spared. For instance, in 1951 approximately 20 paralytic cases were recorded among whites in the Northern Territory and none among aborigines.

In recent years the immunity to poliomyelitis virus of populations in various parts of the world has been studied. Hammon, Sather and Hollinger (1950) have examined the occurrence of Lansing antibodies on Guam and in the various parts of California. Gear, Measroch, Bradley and Faerber (1951) have studied a Bantu urban population in South Africa. Turner and Young (1943) examined serum in Baltimore. Paul and Riordan (1950) investigated Eskimos in North Alaska, and Paul, Melnick, Barnett and Goldblum (1952) have reported on the antibody content to all three types of poliomyelitis virus in serum from Cairo, Egypt.

These investigations have shown a wide variety of antibody pattern. In Egypt, where the disease is endemic and a strictly infantile disease with a high incidence in the first two years of life, rapidly falling thereafter, 50% of the population had antibodies to the Lansing virus at the age of one year, and from three years on almost 100% of Egyptians had antibodies to this virus. At the other extreme are the Eskimos, who had had no recorded cases of poliomyelitis for approximately twenty years before their serum was investigated, and only those aged over twenty years had antibodies to the Lansing virus. The other series fall serologically between these extremes.

The way of life of the Australian aboriginal is very different from that of any of the groups on which reports have appeared, and the low reputed incidence of poliomyelitis may be due to a lack of contact with the virus, possibly to a racial resistance, or possibly, as has been suggested for other groups, to very early contact with the virus at an age when the patient may be less susceptible to paralytic disease than in later years.

An investigation of aborigines from the Northern Territory of Australia was therefore undertaken, primarily with the object of gathering some knowledge of the incidence of antibodies to poliomyelitis viruses among them. In this

[1] Assisted by a grant from the National Health and Medical Research Council.

communication the results of neutralization tests with this serum against the Lansing virus are reported.

Collection of Sera.

It was decided that for this investigation a series of specimens should be collected which would give evidence on the age distribution of antibodies among the Northern Territory aborigines, on whether there were any differences

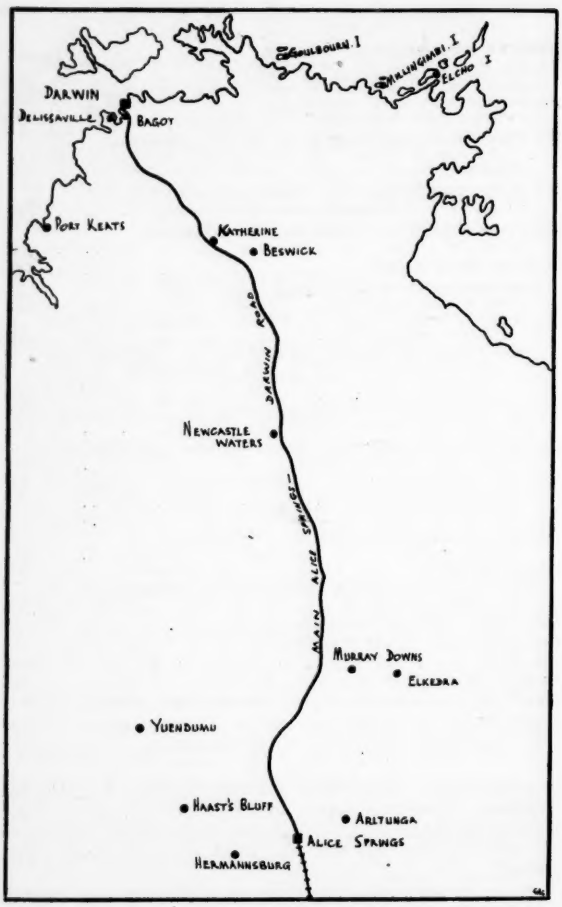

FIGURE I.

between groups of aborigines with varying amounts of contact with white men, and also on whether there were any gross differences in the antibody content of specimens of serum collected at different centres.

An attempt was therefore made to collect a minimum of 30 specimens from a number of centres in the far north and in central Australia, in both areas representative centres with differing amounts of white contact being included. Specimens of serum were, so far as possible, to be collected from equal numbers in the following age groups: nought to four years, five to nine years, ten to fourteen years, fifteen to nineteen years, twenty to twenty-four years, twenty-five to twenty-nine years, thirty to thirty-nine years, and over forty years. A total of at least 200 specimens from groups having relatively little and from groups having relatively great contact with the white population were to be collected.

The specimens were collected in September and October, 1952, which was an unusually propitious time for obtaining the serum of natives with little white contact, since, owing to the drought and consequent lack of game in the bush, many natives not normally resident were present at the missions and government settlements.

Usually the natives were not reluctant to give samples of blood and we failed to collect our minimum number at only one centre. However, we did have difficulty in persuading mothers to bring in the children of the nought to four years age group, and our numbers in this important group were regrettably small.

The numbers may be seen from Tables I and II, and the location of the centres may be seen from the map. The order in which the centres are shown is in an estimated order of increasing white contact, although some difference of opinion may be expressed about the exact order.

TABLE I.

Serum from Various Centres: Results from Lansing Neutralization Tests.

Locality.[1]	Result Positive.	Result Negative.	Total Number of Specimens Tested.
1. Port Keats	45	5	50
2. Haast's Bluff ..	47	4	51
3. Elcho Island ..	37	1	38
4. Millingimbi	28	2	30
5. Beswick	45	3	48
6. Arltunga	39	4	43
7. Goulburn Island ..	27	1	28
8. Delissaville	16	1	17
9. Murray Downs and Elkedra stations ..	25	5	30
10. Hermannsburg ..	28	3	31
11. Bagot	64	7	71
Total	401	36	437

[1] The localities are listed in order, according to the estimated amount of outside contacts with white men, the first having the least outside contact.

Lansing Neutralization Test.

The technique of the Lansing neutralization test used on this occasion was with small modifications that of Paul and Riordan (1950). The strain of virus used was the original Lansing strain, and this virus had to be used as a 20% mouse cord suspension to give 50 mouse $L.D._{50}$ of virus in 0·03 millilitre when an equal volume of undiluted serum had been added in the neutralization test. The serum was stored for between one and five months frozen at −10° C. before the tests were run. Sera after the inoculation of which three or less of the eight mice inoculated died were regarded as giving positive results. When four or more died they were regarded as giving negative results. Had the sera after the inoculation of which three or four mice died been regarded as "doubtful", three of those recorded as "negative" and four of those recorded as "positive" would have come into the "doubtful" group. In the vast majority of cases no mice died, or only one mouse died without showing definite paralysis. In a few cases one mouse died less than twenty-four hours after inoculation. No difference was made in the estimation of the results on such occasions, except that that mouse was excluded.

Results.

Table I shows the results obtained with serum from each of the centres from which it was collected. Murray Downs and Elkedra stations are treated as one centre, since the natives from both very commonly visited the mines at Hatches Creek, and could from the point of view of this investigation be regarded as one group. It can readily be seen that there is no difference between the centres which could not readily have occurred by chance. Except in the case of Bagot, the centres with the larger number of "negative" specimens were those where many young children were seen. At Bagot four of the seven "negative" specimens were from subjects in the over forty years age group.

Table II shows the results in the different age groups when the sera from the first five centres recorded in Table I (from natives with relatively little white contact) and those from the remaining seven centres are treated

TABLE II.
Lansing Neutralization Tests on Serum from Aborigines of Various Ages.

Age Group. (Years.)	Little White Contact.[1]			Heavy White Contact.			Combined.		
	Positive Result.	Negative Result.	Total.	Positive Result.	Negative Result.	Total.	Positive Result.	Negative Result.	Total.
0 to 4	9	6	15	13		19	22	12	34
5 to 9	31	1	32	19	3	22	50	4	54
10 to 14	26	2	28	32	4	36	58	6	64
15 to 19	33	0	33	37	1	38	70	1	71
20 to 24	24	1	25	26	0	26	50	1	51
25 to 29	19	2	21	24	1	25	43	3	46
30 to 39	26	2	28	23	2	25	49	4	53
40+	34	1	35	25	4	29	59	5	64
Totals ..	202	15	217	201	21	220	401	36	437

[1] This group comprises the first five centres listed in Table I.

separately and when all are considered as a single group. It is clear that there is no significant difference between these groups. It would, therefore, appear justifiable to treat all the figures as if they had been derived from a single group.

Over 90% of the natives in all age groups from five years upwards had neutralizing antibodies to the Lansing virus. There was a slight increase in the number of negative findings in the older age groups by comparison with those in the fifteen to twenty-four years age groups, but this increase was not significant. The numbers in the nought to four years age group were small, but the results of subdividing them are shown in Table III. The

TABLE III.
Results of Lansing Neutralization in the Nought to Four Years Age Group.

Age. (Years.)	Positive Result.	Negative Result.	Total.
<2	0	2	2
2	0	5	5
3	7	5	12
4	15	0	15
Total ..	22	12	34

results suggest that the age at which 50% of aboriginal children have developed antibodies to type II poliomyelitis virus is between three and four years. There is no significant difference between any age groups when the nought to four years group is excluded.

The results of subdividing the figures into separate sexes were rather surprising. Except in the over forty years group, a larger proportion of males than females gave a negative response to the Lansing neutralization test. It is improbable that these results could have occurred by chance. The difference between the two groups treated as a whole is just significant ($P = 0{\cdot}05$). If the over forty years age group is excluded, the significance is considerably greater. Although the total numbers of the two sexes were almost exactly the same, they were made up from differing proportions in the various age groups; but the difference was so consistent throughout the various age groups that it does not appear likely that differences in sample size in the various age groups were the cause of the apparent difference in immunity between the sexes. The results are shown in Table IV.

Discussion.

The aborigines whose serum was tested in this investigation were from groups with a varying way of life between two extremes: (i) those who lived mainly a nomadic life in the bush in small groupings, meeting from time to time in large gatherings for corroboree, and who would come in to the remote missions in the aboriginal reserves only when hunting in the bush was poor; and (ii) those who lived in government aboriginal settlements on the outskirts of a town, who worked in the town during the day and normally lived in huts in the settlement, and only from time to time would go "walkabout", usually to attend one of the major corroborees.

It was considered likely, when this investigation was planned, that if poliomyelitis was a disease of white men passing from them to the aborigines, remote tribes might give little evidence of past infection. Our evidence, however, indicates that, at least in the Northern Territory of Australia, contact with poliomyelitis viruses is almost universal, and that virtually all aborigines have developed antibodies to the Lansing virus by the age of five years.

TABLE IV.
Results of Lansing Neutralization Tests, Males and Females.

Age Group. (Years.)	Males.			Females.		
	Positive Result.	Negative Result.	Total.	Positive Result.	Negative Result.	Total.
0 to 4 ..	10	8	18	12	4	16
5 to 9 ..	29	3	32	21	1	22
10 to 14 ..	32	4	36	26	2	28
15 to 19 ..	27	1	28	43	0	43
20 to 24 ..	23	1	24	27	0	27
25 to 29 ..	18	3	21	25	0	25
30 to 39 ..	17	3	20	32	1	33
40+ ..	38	2	40	21	3	24
Totals ..	194	25	219	207	11	218

Whether the disease is one which has always been endemic among them, one acquired in the past by contact with natives of Indonesia and south-east Asia who have visited the north coast of Australia for centuries, or one acquired from white Australians, it is impossible to say over a hundred years after white settlement of the Territory commenced.

In view of the finding that by the age of five years almost all Northern Territory aborigines have antibodies to the Lansing virus, and the close correlation found in other parts of the world between the age at which poliomyelitis cases occur and the age at which Lansing antibodies develop, it is to be expected that any cases of the disease which did occur would be in children aged under five years. During my visits I was shown two infants at one mission who, in 1951, had had a disease thought by the sister-in-charge to be poliomyelitis. They did not show any residual paralysis when seen. A case of paralytic poliomyelitis was seen among aborigines in the Alice Springs region in the 1937 epidemic. I did not see any cases of residual paralysis attributable to poliomyelitis during my visits, but I was informed that a few affected persons did exist.

It appears that the situation among the Northern Territory aborigines is not very greatly different from that in other groups when poliomyelitis viruses are endemic and immunity develops consistently at an early age.

The difference between the sexes cannot be readily explained in the number of specimens of serum containing antibodies to the Lansing virus. The adolescent and adult males spend much of their time away from the women, and small differences in antibody content might be due to differences in habit; but the same trend is apparent in the young children who stay with the women. On so small and isolated a piece of evidence speculation would be idle.

Summary.

1. Four hundred and thirty-seven specimens of serum from aborigines of the Northern Territory of Australia were examined for neutralizing antibody to Lansing (Type II) poliomyelitis virus.

2. Over 90% of aborigines five years old or more had neutralizing antibodies.

3. The age by which 50% had developed antibody was between three and four years.

4. There was no significant difference between groups from different areas in the Territory, or between groups living under differing conditions with varying amounts of contact with white men.

5. More females than males had antibodies to the virus, and this difference was apparent in all age groups below forty years.

Acknowledgements.

It is a pleasure to acknowledge my debt to Dr. E. A. Cornish for the statistical analysis of the results; to Dr. C. E. Cook and Mr. C. P. Mountford for their advice in planning the collection of the specimens; to Dr. S. Watford, Dr. C. E. Welton and Mr. F. Moy for assistance without which this investigation would have been impossible; to the superintendents and staffs of the missions at Port Keats, Goulburn Island, Millingimbi, Elcho Island, Arltunga, Hermannsburg and Haast's Bluff, and of the government settlements at Delissaville, Bagot and Beswick; and to Mr. B. Brown, of Murray Downs, and Mr. F. Driver, of Elkedra, for generous and patient cooperation.

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OBSERVATIONS ON SERUM FROM ABORIGINES IN THE NORTHERN TERRITORY OF AUSTRALIA: II. ANTIBODIES AGAINST MURRAY VALLEY ENCEPHALITIS (X DISEASE), PSITTACOSIS AND "Q" FEVER.

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IN a paper on Murray Valley encephalitis Miles and Howes (1953) showed that nearly one-quarter of the sera from the Yuendumu area in the Northern Territory contained antibodies to the virus, and in a discussion on the epidemiology of the disease they suggested that endemic areas were likely to be found there.

At the same time Stokes examined these sera and found that three contained low titre antibodies to psittacosis, but that none gave a positive result to the complement fixation test for "Q" fever. Stokes (1950) reported "Q" fever occurring among the abattoir workers from the beef hall at the Adelaide metropolitan abattoirs, but in later investigations she failed to find the source of the infected cattle, although she tested serum from many cattle from the Northern Territory and South Australia, since cattle were thought to be responsible for these cases.

In view of these findings we decided to test as many as possible of the specimens of aboriginal serum collected in the Northern Territory during a survey of immunity to poliomyelitis viruses for the presence of antibodies to these agents, in the hope of locating endemic foci of Murray Valley encephalitis and "Q" fever, and to get a clearer picture of the amount of psittacosis infection among aborigines in the Northern Territory.

Materials and Methods.

The location of the centres from which serum was collected are shown on the map (Figure I) and the reasons for their selection have been described in the first paper of this series (the preceding paper, by Miles, in this issue of the journal).

The techniques of the complement fixation and neutralization tests used for Murray Valley encephalitis have been previously described (Miles and Howes, 1952). It was found that in nearly all cases in which the complement fixation test result was positive, the neutralization test result was also positive, while approximately twice as many sera gave positive results by the neutralization test as by the complement fixation test.

To reduce the number of mice used in these experiments, all specimens of serum were first examined by the complement fixation test, and only "negative" sera were then tested by the neutralization test. Serum giving positive results to either test were regarded as containing antibodies.

Antibodies to "Q" fever and psittacosis were tested by the complement fixation test by the use of yolk-sac antigens and one hour's fixation at 37° C. in a water bath in the presence of two minimal hæmolytic doses (M.H.D.) of complement.

After the addition of 3% sheep's red corpuscles sensitized with five M.H.D. of hæmolysin, tubes were returned to the water bath for thirty minutes. Tubes were centrifuged to deposit the remaining cells, and the end point was then taken as the last tube showing less than 50% hæmolysis. No positive finding was recorded unless complete fixation occurred in the presence of a serum dilution of 1:5.

Results.

Murray Valley Encephalitis.

The results of our investigation of antibodies against Murray Valley encephalitis are shown in Tables I and II.

Table I shows the results of complement fixation tests on serum collected at different centres, and Table II the full results of both complement fixation and neutralization tests.

There was no group which failed to contain any serum giving positive results, but the number of positive results was much lower from the three centres at the latitude of Alice Springs (the last three in the tables), which gave only five positive results in 64 specimens tested, as against 128 of 202 in the other areas. Except for these centres, there was no place where the proportion of positive results was not either approaching or over one-quarter of the total tested.

Three centres showed a very high percentage of positive results: Port Keats on the north-west coast, Beswick about 300 miles south of Darwin, and the cattle stations Murray Downs and Elkedra about 200 miles north of Alice Springs (see map, Figure I of previous paper). In each of these areas between 86% and 89% of sera tested gave positive results, and it was notable that with all the eleven sera recorded as "negative" some mice survived inoculation with 50 $L.D._{50}$ of virus mixed with the serum, while in the areas

[1] Assisted by a grant from the National Health and Medical Research Council.

showing less positive results all mice died when inoculated with the same dose of virus mixed with the "negative" sera. The impression was obtained that it was likely that all aborigines in these areas had been infected with the virus at some time. In the complement fixation test serum from these centres gave not only a larger proportion of positive results than those from other areas, but also more of the "positive" sera had a titre over 1:5 (21 out of 42, as against 6 out of 24).

TABLE I.

The Results of Complement Fixation Tests Against Murray Valley Encephalitis Virus with Sera from Aborigines.

Locality.	Number of Specimens Tested.	Number of Sera Giving Positive Results at Dilutions Shown.				Total Positive Results.
		1:5	1:10	1:20	1:40	
Port Keats	33	6	4	4	1	15
Delissaville	12	3	0	1	0	4
Bagot	44	6	3	0	0	9
Goulburn Island ..	20	3	0	0	0	3
Millingimbi	19	6	0	0	0	6
Elcho Island	17	0	0	1	0	1
Beswick	36	12	0	7	0	19
Murray Downs and Elkedra	21	3	3	2	0	8
Aritunga	28	0	1	0	0	1
Hermannsburg ..	8	0	0	0	0	0
Haast's Bluff ..	28	0	0	0	0	0
Total ..	266	39	11	15	1	66

Psittacosis.

The results of the complement fixation tests against psittacosis virus are shown in Table III. There are interesting differences in the findings from different areas. The only positive results found in the northern coastal region were in natives resident in the settlement at Bagot. Since the Bagot natives are detribalized and have come to Darwin from a wide area over the northern half of the Territory, and since all three subjects giving positive results were adult males, they may have been infected in other areas.

At least one "positive" specimen of serum was found from each of the inland centres. Six of these sera were from children, aged eleven years or less, and the remaining four from adults.

If the "positive" sera from Bagot are neglected, the difference observed between coastal and inland areas is significant. The titres found were high, and some probably represent recent infections.

"Q" Fever.

The results of the complement fixation tests against *Coxiella burneti* are also shown in Table III.

Among the 328 specimens of serum examined, only six showed antibodies to *C. burneti*, but these came from two areas, Beswick and Hermannsburg–Haast's Bluff. Both are inland areas where the natives have contact with cattle. At Hermannsburg three out of 23 sera tested gave positive results. Two of the three were from women, but at this centre the men were very unwilling to be bled, and 18 of the 23 sera tested were from females. The "positive" serum from the adjoining Haast's Bluff mission, where the natives belong to the same tribal group, was also from an adult female.

TABLE II.

Results of Both Serological Tests Against Murray Valley Encephalitis Virus with Serum from Aborigines.

Locality.	Number of Specimens Tested.	Complement Fixation Test Positive Result.	Complement Fixation Test Negative Result, Neutralization Test Positive Result.	Negative Results to Both Tests.	Total Positive Results.
Port Keats ..	33	15	14	4	29
Delissaville ..	12	4	0	8	4
Bagot ..	44	9	17	18	26
Goulburn Island	20	3	2	15	5
Millingimbi ..	19	6	4	9	10
Elcho Island ..	17	1	3	13	4
Beswick ..	36	19	13	4	32
Murray Downs and Elkedra	21	8	10	3	18
Aritunga ..	28	1	1	26	2
Hermannsburg	8	0	1	7	1
Haast's Bluff	28	0	2	26	2
Total..	266	66	67	133	133

Discussion.

Murray Valley Encephalitis.

The results of this serological examination of aboriginal serum amply confirm the suggestion of Miles and Howes (1953), based on their findings on sera from Yuendumu, that a high proportion of the natives of the Northern Territory would be found to have antibodies to Murray Valley encephalitis. Only in the areas at the same latitude as Alice Springs are the number of "positive" sera small; elsewhere the proportion of "positive" results is as high as or higher than that in the Murray Valley in the year following the 1951 epidemic (Anderson *et alii*, 1952; Miles and Howes, 1953).

The three centres in which 86% to 89% of sera gave positive results are of special interest, because of the likelihood that they are very near endemic foci of the disease.

TABLE III.

Results of Complement Fixation Tests Against Psittacosis and "Q" Fever with Serum from Aborigines.

Locality.	Number of Specimens	Number of Sera Giving Positive Results at Dilutions Shown.									
		Psittacosis.					"Q" Fever.				
		1:5	1:10	1:20	1:40	1:80	1:5	1:10	1:20	1:40	1:80
Port Keats	34	0	0	0	0	0	0	0	0	0	0
Delissaville	11	0	0	0	0	0	0	0	0	0	0
Bagot	43	1	0	2	0	0	0	0	0	0	0
Goulburn Island ..	25	0	0	0	0	0	0	0	0	0	0
Millingimbi ..	24	0	0	0	0	0	0	0	0	0	0
Elcho Island ..	26	0	0	0	0	0	0	0	0	0	0
Beswick	33	0	0	1	0	0	0	1	1	0	0
Murray Downs and Elkedra ..	31	0	0	1	3	0	0	0	0	0	0
Aritunga	33	0	0	0	0	1	0	0	0	0	0
Hermannsburg ..	23	0	0	0	0	1	0	0	2	1	0
Haast's Bluff	45	0	0	0	3	0	0	1	0	0	0
Total	328	1	0	4	6	2	0	2	3	1	0

Anderson *et alii*, and Miles and Howes (1952) have brought evidence to suggest that the complement-fixing antibody may be less enduring than the neutralizing antibody, and it is difficult to see how the amount of virus which a mosquito could transmit could act as a stimulus to the formation of fresh complement-fixing antibody, unless the virus was able to multiply locally at the site of the inoculation. Whether this is so or not is unknown; but an epidemic great enough to cause infection of 50% of the population of the Northern Territory occurring in the summer of 1951-1952 without producing sufficient clinical disease to call attention to itself is still less probable. We are of the opinion that the most likely explanation of our results is that the disease is highly endemic in certain areas in the Territory, such as those where we have found our highest number of "positive" sera, and that it commonly spreads in the more northerly parts where the rainfall is high and mosquitoes are numerous, but less readily in the drier areas around Alice Springs.

The location of the three supposedly endemic centres is interesting. Two are, as we had expected, in the high rainfall area in the far north; but the third is in an area with approximately 12 inches annual rainfall. However, even under the drought conditions of October, 1952, these stations had a number of large water holes containing a surprising amount of water which was attracting numerous water-fowl.

Whether such centres as these, or a hypothetical area such as Anderson and Eagle have suggested near the sources of the River Darling (1953), are responsible for the occasional outbreaks of the disease in south-eastern Australia is at present purely a matter for speculation.

Psittacosis.

The interest of our findings on psittacosis antibodies lies in the difference between coastal and inland natives, which is unlikely to be merely a chance finding. We are inclined to think that the difference probably derives from a difference in diet, since coastal natives catch and eat large quantities of fish and relatively few birds, while the inland natives eat far more birds and commonly take young parrots from the nesting holes, when they are most likely to be excreting virus and to have virus-contaminated feathers or down.

There is no evidence that aborigines are infected with *lymphogranuloma venereum*. Further, the distribution of sera containing antibodies (few or no "positive" sera from the coastal zone, but far more from inland areas), and the age distribution with six of thirteen positive findings in subjects under the age of twelve years, are against these results being due to infections with the virus of *lymphogranuloma venereum* rather than psittacosis.

The susceptibility of aborigines to pneumonia is notorious, and in the inland areas, where between 3% and 4% have antibodies to psittacosis virus, this disease may be of more importance than in most other parts of the world.

"Q" Fever.

We have found very few sera which gave a positive response to the complement fixation test for "Q" fever, but the six "positive" sera came from two areas, one to the east of Katherine and the other to the west of Alice Springs. The titres of antibody were only moderate and do not necessarily indicate recent infection; but the proportion of positive results at Hermannsburg (three out of 23 sera tested) was high, and strongly suggests that there is an endemic focus in this area. The evidence from Beswick is not so clear-cut. Both the areas in which the positive results were found are areas where the natives have contact with cattle and possibly also with goats, so that there would be no need to postulate any unusual mode of spread. A spread through contaminated dust would be likely.

Summary.

1. One-half of 266 aboriginal sera from the Northern Territory contained antibodies to Murray Valley encephalitis. In three of the areas investigated 86% to 89% of sera gave positive results, and reasons are given for thinking that endemic foci of the disease exist in such areas.

2. Antibodies to psittacosis virus were rare in the coastal region, but not uncommon inland. It is suggested that differences in feeding habits may explain this finding.

3. Antibodies to *Coxiella burneti* were found in only two districts, and it is suggested that there is probably an endemic focus of the disease to the west of Alice Springs and possibly another to the east of Katherine.

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"Q" FEVER IN SOUTH AUSTRALIA: II. SURVEYS OF HUMAN AND BOVINE SERA.

By JOAN STOKES.

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IN the summer of 1947-1948 there was a small outbreak of "Q" fever among the workers of the metropolitan abattoirs of Adelaide, and *Coxiella burneti* was isolated from two of the 14 cases which occurred at that time. Between twelve and sixteen months later a serological survey was carried out on the abattoir workers themselves and a number of other infections were revealed. Volunteers came from the beef hall and the cattle saleyard, and blood was taken from 99 in all. Cattle being an accepted source of infection, the blood of 793 head from northern areas and of 641 cows from dairying districts was also tested.

Abattoir Workers.

The surveys of the abattoir workers' serum was made twelve to sixteen months after the original outbreak. The technique for performing the test was similar to that described in a previous paper (Stokes, 1950), except that, as human serum has not been shown to react non-specifically with normal yolk-sac antigens, these were rarely included in the controls.

Of the 79 workers from the beef hall who volunteered to give blood, the serum of 26 gave complement-fixing titres to "Q" fever, while the serum of the 20 cattle saleyard workers gave negative results. The 26 "positive" sera included 10 from the 12 cases which had been diagnosed serologically shortly after the outbreak. The other two patients in the first series of 12 were workers from the casement factory, at which both beef and sheep offal are processed. The serum titres varied between 1 in 8 and 1 in 2048, with an average of 1 in 16 to 1 in 32 for 23 of 26 sera. One man had maintained a serum titre of 1 in 2048 for fifteen months after his illness, and his serum titre was still 1 in 512 some twenty-nine months after infection.

Since the 1947-1948 outbreak a number of cases have come to our notice. The first five occurring in December, 1948, and in March, August and December, 1950, were mostly isolated, and all were diagnosed serologically, with rises in serum titres of between 0 and 1 in 256 to 1 in 2048. The first three were at the metropolitan abattoirs, one of the subjects being the canteen proprietor, and it is curious that this should have been the one reported case when so many other workers were apparently at much greater risk. *C. burneti* was isolated from this case.

The two cases which occurred in August, 1950, were from the Noarlunga abattoir, both patients being admitted to the Royal Adelaide Hospital at the same time. An examination of the serum of 11 other workers at that abattoir failed to indicate further infections.

A further seven cases occurred at the metropolitan abattoirs in February and March, 1951, with five weeks between the onset in the first and last cases, and these may have constituted a minor outbreak with a common source of infection.

Two further definite cases and a doubtful case were recorded for 1952; two subjects were abattoir workers and one was a herd tester. In both the abattoir workers either a clear-cut rise in titre or a high convalescent titre was demonstrated—one late in convalescence. The herd tester gave a doubtful rise of 1 in 16 to 1 in 32 in convalescence, and it was not possible, because of the dubious nature of his illness and his prolonged history of association with cattle all over the State, to investigate further the source of infection. A further case, in which a titre of 1 in 64 was found, and in which no rise in titre occurred over a period of a month, came to notice in April, 1953; but there was no proof that this was a recent infection.

In all there have been only 15 recognized cases of "Q" fever in five years since the original outbreak, and on these grounds alone it seems unlikely that the source of infection is extensive. One hundred and eight specimens of serum collected from both city and country areas, from persons other than abattoir workers, with one very dubious exception gave negative results.

Laboratory Workers.

Four clinically recognizable cases of "Q" fever occurred in laboratory workers over a period of twenty-three months. The dates of infection corresponded to periods of intensive cultivation of *C. burneti* in embryonated eggs. The first three cases occurred within four months of one another. The two assistants immediately concerned with the work and another from a neighbouring laboratory were involved, while the fourth patient was another assistant from the same laboratory as the third.

A survey of 32 members of the staff twelve months after the occurrence of the first three cases showed that only one case of subclinical infection was experienced. This subject was a typist whose office was near the laboratory where work was in progress, and who had cause to visit the laboratory on several occasions. She showed no sign of any illness resembling "Q" fever during the period of exposure.

A further survey was made of 12 assistants in neighbouring laboratories, including two new workers in the virus department. This brought to light a fourth clinical case, in a person whose illness had previously passed undiagnosed. One of the new assistants in the virus department had developed a complement-fixing titre of 1 in 8 without signs of illness since the previous occasion on which blood had been taken from him.

Guinea-pigs inoculated with the Herzerling strain of "Q" fever were housed in the animal house for a month while "Q" fever work was in progress. All possible precautions, short of immunization, were taken to prevent infection of the animal house staff, and the serum of the workers present over this period continued to give negative results.

Bovine Sera.

Seven hundred and ninety-three sera were collected over a period of twelve months (between December, 1949, and December, 1950) from cattle killed at the abattoirs. These cattle all come from northern areas, and an analysis of their sources is given in Table I. For the same period only four cases of "Q" fever were reported, and two of these came from the Noarlunga abattoir. All these sera gave negative results.

From September, 1952, to March, 1953, a further 644 sera from dairy cows which had been sent to this institute for Brucella agglutination tests were examined. These cattle came chiefly from the dairying districts of the Mount Lofty Ranges, from Victor Harbour in the south to Jamestown in the north, with a few sera from the south-east; but most of them came from areas within a fifty to sixty mile radius of Adelaide. These also have given negative results.

TABLE I.

State.	Area.	Number of Sera.
Queensland.	Southern and western.	318
South Australia.	North of Maree.	158
New South Wales.	Western.	50
Northern Territory.	South and eastern.	224
Unplaced.		43
Total ..	.. ..	793

In the early stages of the work considerable difficulty was experienced in the testing of bovine sera because of non-specific fixation of complement with normal and rickettsial yolk-sac antigens. Such non-specific fixation was found to be eliminated by heating the sera for a quarter of an hour at 60° C. instead of half an hour at 56° C. One of the sera from northern areas (South Australia) gave a complement fixation titre of 1 in 16 with "Q" fever antigen, but a negative result with normal yolk-sac antigen. The complement-fixing capacity of this serum was almost entirely lost after heating at 60° C., as was the more obviously non-specific activity of other sera, and probably therefore the result has no significance.

Discussion.

Since the first recording of "Q" fever as a new disease in South Australia five years ago, 42 sera giving positive findings have been discovered, apart from laboratory infections, which account for a further six. Cattle have been shown to be the chief source of infection in this country, and it is not therefore surprising to find that all but two of the natural infections have been discovered in abattoir or casement factory workers, where exposure to infected body fluids from cattle is inevitable.

Volunteers were selected from among the beef hall workers of the abattoirs only, because at the time of the investigation those who became clinically ill (apart from the two casement factory workers) worked all or most of the time in the beef hall, or came in contact in some way with cattle. Workers handling sheep all the time did not come to our notice, and for this reason cattle sera were examined in the survey of animal sera for the most likely source of infection. The series tested is not large, but does at least indicate that the cattle entering the abattoirs are seldom infected. I am in agreement with Derrick (1952), who states that the source of the human cases is probably endemic infection of cattle; but it seems unlikely that the endemic areas are extensive, and this survey has not given any indication of where they may be.

Summary.

1. Forty-two natural infections with *C. burneti* have been recorded in South Australia since the beginning of the original outbreak in the summer of 1947-1948.

2. The sera giving positive results have been from abattoir workers, with the exception of four—two casement factory workers, one the canteen proprietor at the abattoirs, and one a herd tester.

3. All patients whose serum was tested twelve to sixteen months after their illness had complement-fixing antibodies varying in titre between 1 in 8 and 1 in 2048. One man still had a titre of 1 in 512 twenty-nine months after infection.

4. During the course of the work there were six laboratory infections, four clinical and two subclinical. The four clinical cases all occurred when the rickettsiæ were being extensively cultivated in eggs.

5. Seven hundred and ninety-three bovine sera from cattle from northern areas, and 641 from dairy cattle from central and southern districts were tested, and these all gave negative results.

Acknowledgements.

I wish to thank the general manager of the abattoirs, Mr. E. Rainnie, and his staff and men for the continued help over the period during which this work was in progress, both in obtaining volunteers and in the collection of cattle blood.

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THE MODERN TREATMENT OF BENIGN PROSTATIC OBSTRUCTION.[1]

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Historical Survey.

WHEN it is remembered that prior to about sixty years ago the only possibility of relief for the sufferer from prostatic obstruction was by the passage of a catheter, which was the metal variety, not sterilized, and frequently carried in the pocket of the patient or the top hat of the doctor, it will be realized that one of the greatest scourges of aging men has been virtually conquered. Partial prostatectomy or attempts at prostatectomy were first recorded by McGill, of Leeds, as early as 1889 (Rowlands and Turner, 1937), and Fuller removed most of the prostate in 1895 (Rowlands and Turner, 1937); but the results were so poor that the operations were abandoned in favour of castration and vasectomy, which, however, were soon found to give little or no relief and a high mortality rate.

Modern prostatic surgery was really founded by Sir Peter Freyer in 1901 (Rowlands and Turner, 1937); he described the operation of enucleation of the prostate *en masse*. The operation was frequently preceded by a temporary suprapubic cystotomy on account of severe sepsis or poor renal function. The essential steps in the operation were the placing of the patient in the Trendelenburg position after the administration of the anæsthetic, after which a suprapubic mid-line incision some three or four inches long was made, and the bladder was opened. Then, with a finger in the rectum to support the prostate and one in the bladder to enucleate the adenoma, the adenoma was dissected out. A wide bore suprapubic tube was then inserted into the bladder, the wound was repaired and the patient was sent back to bed. No attempt was made to control hæmorrhage or to institute dependent drainage of the bladder and control sepsis, and as a consequence the convalescence was prolonged and the mortality was high. This operation was that generally in use even as recently as twenty years ago in some quarters, and, although it is now completely outmoded, I believe that some older practitioners still practise it. The next step forward was through the work of Thomson Walker, who abandoned that part of the technique which required the finger in the rectum. He dissected the gland entirely from the bladder, and in addition resected a wedge of tissue from the posterior aspect of the bladder neck and inserted several hæmostatic sutures in the bladder neck and prostatic bed. Many authorities criticized his work as misplaced plastic work in a septic field; but no doubt he did much to advance the science of prostatic surgery.

While this work was going on in England, urologists on the Continent such as Proust (1901—Rowlands and Turner, 1937) advocated the method of perineal prostatectomy, which was perfected by H. H. Young, of Baltimore, who invented a whole series of special instruments for the purpose. However, the operation has never been popular, except temporarily so in America, because of the difficulty of performing it and the great liability to serious complications—namely, incontinence of urine and perineal fistula formation. It can now be regarded as quite obsolete, and in Australia it was practised only occasionally.

The next great advance in prostatic surgery I believe was made by an Australian surgeon, S. Harry Harris, in 1934. He added to Peter Freyer's technique several important modifications which changed the face of prostatectomy. By the use of special instruments he obtained much improved hæmostasis, he tied in a catheter to drain the bladder (thus obviating the formation of a stinking cesspool of stagnant urine in the base of the bladder), and he closed the bladder. Few operators were ever able to obtain sufficiently good hæmostasis to close the bladder confidently, so that Harris had not attained the ideal operation for everyone. On account of the still unsatisfactory state of prostatectomy during the later part of the 1930's, transurethral prostatic resection was developed in the United States to a high degree, either by the cold punch method of Thomson or with the diathermy cutting instrument of McCarthy. The advantage of the method is that it avoids an open incision, the bladder remains closed and the patients can often get up and pass their urine within a few days. However, the disadvantages are considerable in a great proportion of cases. They are (i) the incomplete removal of the adenoma, (ii) persisting sepsis and (iii) the not infrequent incontinence of urine due to injury to the sphincter. So serious was this in America that the sale of incontinence clamps rose to tens of thousands a year in a few years in America.

The last great advance in prostatic surgery, I believe, was with the advent of Millin's (1947) method of prostatectomy. The first reference to a suprapubic extravesical prostatectomy mentioned by Millin in his book is that of Van Stockman of Rotterdam in 1909. Van Stockman described the operation in much the same terms as those in which the operation of Millen is described, except that a tube was inserted into the bladder and removed on the fifth day, the catheter being removed on the twelfth day. He believed that the operation was more rational than that of Freyer and did less damage. In 1924, Otto Maier of Innsbruck reported a series of four cases dealt with by much the same method, except that he adopted a lateral inguinal approach as for herniorrhaphy. He held that a satisfactory prostatectomy should (i) approach by the shortest route, (ii) avoid damage to the bladder, (iii) avoid damage to neighbouring structures—for example, rectum, ureter, vesicles *et cetera*, (iv) provide a rapid return to normal micturition, and (v) avoid fistulæ.

Millin performed his first retropubic extravesical prostatectomy in August, 1945, marking the last great advance in prostatic surgery.

Results of Prostatectomy by Millin's Method.

As we jog on, either laugh with me, or at me, or in short do anything,—only keep your temper.

On opening my new desk calendar for 1953, I noticed the foregoing quotation from Laurence Sterne on the first page, for January 1, 1953. As I set out to discuss the experiences with a series of cases of prostatectomy per-

[1] Read at a meeting of the South Australian Branch of the British Medical Association on June 18, 1953.

formed by Millin's method, it seemed appropriate to commence with this opening warning, because it is likely that before the final paragraph is read you will need to bear it in mind. As a student and house surgeon at the Royal Adelaide Hospital from 1922 to 1925, I have vivid recollections of old men lying in the wards for weeks before operation, their bladders slowly draining to recover kidney function, urethræ forming pus, pre-operative and post-operative epididymo-orchitis and sudden deaths from embolism, and of straggling remnants crawling home wasted, anæmic, physically and mentally ruined in many cases after their suprapubic wounds had gradually closed up with leaky Hamilton Irving caps covering them, and with stinking urinous beds. They were treated by suprapubic prostatectomy by Freyer's method, which, except in the hands of a few who still follow this historical method, has become completely obsolete.

Harris (1934–1935), in the opening paragraph of his paper, stated that "the everyday methods, it must be admitted, lack completeness and finish, and have for too long been a reproach to the surgery of the prostate". There was certainly no doubt about that. He went on to state that for some years he had been perfecting his improved method of prostatectomy with closure of the bladder. He held that Freyer's method of prostatectomy had served its purpose and should then be discarded. Harris's method was promulgated widely and very soon became the standard method of prostatectomy in the major centres of Australia. His method was not followed in its entirety, but certain parts of the technique—namely, free drainage of the bladder by a properly maintained indwelling catheter, and a valiant effort to secure hæmostasis under direct vision with more careful asepsis—were the greatest factors in improved results. However, few surgeons found that they could obtain sufficiently good hæmostasis to be safe in primary closure of the bladder, and most inserted a wide suprapubic tube, which was removed after forty-eight hours. This enabled clots to be safely evacuated from the bladder in the early stages, and by early removal of the tube before its track was indurated the sides of it fell together and the bladder was soundly healed by the tenth to twelfth day, when the catheter was removed and the patient was able to pass his urine. He had avoided the misery of the stinking cesspool of an undrained bladder, the suprapubic overflow and leakage into the bed, all the train of evils which accompanied Freyer's operation which it is superfluous to mention again here.

But time moves on, methods change and nothing is static in the whole universe.

Harris (1934–1935) described his preparatory treatment as follows:

> Preliminary catheter drainage is employed for at least 10 days, or preliminary cystostomy for at least a month, if catheterisation is unsuccessful, if the urine is dirty, if the residual urine exceeds 120 cubic centimetres (four ounces), or if the renal function is below par.
>
> Vas ligation for the prophylaxis of epididymitis is practised as a routine measure.

He also explained at much length his methods for the emptying of an over-distended bladder and the tests for renal function. Today I consider that these methods, while they may be required in a very rare case, are also almost on the obsolete list. Harris's work, while not accepted as widely in other parts of the world as in Australia, was of such high quality that it did a great deal towards the perfection of the methods of prostatectomy. Our results, compared with the past, were very, very gratifying; but others were not so pleased. Perineal prostatectomy had sunk into an unhonoured grave, for the immediate mortality was high, and post-operative incontinence of urine and fistula formation were common. Hamilton (1938–1939), of Newcastle, read a paper at the meeting of the Royal Australasian College of Surgeons in Sydney in March, 1938, on the results of prostatectomy. The results were as shown in Tables I and II, which are taken from Hamilton (1938).

Hamilton goes on to make the following statement:

> . . . the main essential in further improving the mortality and morbidity rates is to organize much more intensively the after-care of the patient in the public wards. Newcastle Hospital has a loyal and willing nursing staff, but even this fact does not counteract the difficulties of frequent staff changes and the absences on week-ends and holidays of those engaged in prostatectomy nursing. The late R. K. Lee-Brown pointed out that if ever a surgeon was at the mercy of a hospital staff, it was the urologist following a prostatectomy with primary closure. He further emphasized that the first and more essential requirement was a reliable staff that appreciated the meaning of asepsis, and was willing to give continuous and faithful attention to the strictly aseptic after-treatment of the patient.

TABLE I.

Newcastle Hospital.

Prostatic Operations.

February 9, 1928, to March 5, 1937.

Total number of operations	68
Total number of deaths	13
Total mortality percentage	19·11
Subrapubic operations	14
Deaths	5
Percentage	35·71
Perineal operations	54
Deaths	8
Percentage	14·81
Readmissions (all types) with fistulæ, obstruction or incontinence	10 (14·7%)
After suprapubic operation: 3 cases.	
After perineal operation: 7 cases.	
Number of cases with carcinoma (diagnosed microscopically)	6
Cancer percentage, with microscopic examination (36 examinations)	16·6
Percentage (clinical)	8·82
Average number of days in hospital (post-operative)	42·35
Greatest number of days (post-operative)	148
Least number of days (post-operative)	19
Average number of pre-operative days	25·48
Average age of patients	66·22 years
Oldest aged patient	87 years
Youngest aged patient	49 years

Total Group Mortality.

Age.	Operations.	Deaths.	Percentage.
80 to 87 years	3	3	100
70 to 79 years	22	5	22·7
60 to 69 years	30	2	6·6
50 to 59 years	12	3	25·0
40 to 49 years	1	0	0

Perineal Group Mortality.

Age.	*Operations.*	*Deaths.*	*Percentage.*
80 to 87 years	3	3	100
70 to 79 years	16	2	12·5
60 to 69 years	23	1	4·3
50 to 59 years	11	2	18·1
40 to 49 years	1	0	0

Julian Smith, junior (1938), at the same meeting, produced the most disturbing figures from the Royal Melbourne Hospital. Leaving out of consideration some of the statements, I would refer readers to the tables on page 33 of his article.

What courage to publish such results! To my knowledge the over-all results at the Royal Adelaide Hospital have never been analysed.

One's own feeling is that it is necessary to improve the operative technique and the pre-operative and post-operative care until such a point is reached that trouble-free operations and convalescence are the regular expectation and the patients can be nursed in any good nursing institution.

Transurethral prostatectomy became popular in America, but except for certain specific types of cases it has never been popular outside that country. The indications for transurethral resection are few.

I have not much to say about endoscopic resection. Whilst travelling in England in 1951, I noted that resection is rarely seen on operation lists. Millin's method of retropubic prostatectomy seemed to be that almost always used. Many operators modify the operation slightly to their own ideas, but basically Millin's method is almost universally employed. My own belief is that endoscopic resection has a very limited place in prostatic surgery, and should be reserved possibly for the fibrous bar, although this can be dealt with by open methods, and for canalization in an occasional case of carcinoma of the prostate which does not respond to hormone therapy and which is unsuitable for radical prostatectomy.

TABLE II.

Nine-year Series, Newcastle Hospital. Follow-up of 43 Patients Discharged as "Cured" after Prostatectomy.

Number of letters answered	33
Perineal operation	29
Suprapubic operation	4
Results.	
Good (no urinary symptoms)	14
Fair (slight urinary symptoms)	4
Poor (sinuses and incontinence)	7
Died (including 4 cases within one year)	8

Earlam (1938), in discussing the indications and results of endoscopic resection in general, made the following statement:

> The question which is still contentious is the duration of the patient's symptomatic relief. In very many cases this is quite sufficiently permanent, and it appears perfectly justifiable to assume that if a patient has had an efficient resection and a satisfactory immediate result, he can almost always expect a five-year cure at least, while if all the hypertrophied tissue be removed, as can with increasing experience be more and more often achieved, the result should be as permanent as that following suprapubic prostatectomy. I have several four-year cures after resections that I would not now class as completely efficient, and in which much adenomatous tissue was left behind. If, therefore, the patient has a short expectation of life and requires operation, I think resection is definitely preferable if it can be carried out with good prospects of success.

TABLE III.[1]

Results in the Series of 810 Patients Treated.

Died without any operative treatment	101	
Died after cystostomy	60	
Discharged with permanent cystostomy	72	354
Died after prostatectomy	104	
Various	17	
Survived prostatectomy		456
		810

[1] Table VI in Julian Smith's paper.

Millin (1947) makes the following statement:

> I have personally removed by supra-pubic prostatectomy some 75 grams of prostatic tissue from a patient resected in a leading Middle West American transurethral clinic. I have heard of several similar cases from American urological friends. The total transurethral prostatectomies claimed by many resection enthusiasts fall far short of complete removal of hypertrophic tissue. It appears to me high time that this was recognised.

Earlam about sums up one's impressions—that something can be done by resection, but in many cases much adenomatous tissue is left behind. The cases are never finalized, many patients have ultimately to have open prostatectomy performed, and many are left incontinent of urine or with infection. The high percentage of urethral strictures has also not been sufficiently emphasized.

I shall later proceed to show that by open prostatectomy the patients are brought quickly to cure with extraordinarily few complications—even the aged, the debilitated, the infected, and those with other serious complaints.

In my general surgical department at the Royal Adelaide Hospital, no patient with benign prostatic obstruction has been treated by endoscopic resection in the last four years. Millin (1947) describes a very effective retropubic operation for the fibrous prostate, which, either as described, or as modified to suit the individual operator, probably gives better results than endoscopic resection even for this type of prostatic obstruction, and the risk of complications such as incontinence of urine is infinitely lessened.

The complications of this endoscopic operation, of which incontinence of urine is the greatest, are such that better methods have been sought. The incontinence rates following transurethral resection are not known exactly, but as was mentioned previously, in the United States of America when the method was made popular the sales of incontinence clamps rose steeply.

TABLE IV.[1]

Results in each 100 Patients with Prostatic Obstruction.

Died without any more than catheterization	12
Died after suprapubic cystostomy	7
Discharged with permanent cystostomy	9
Died after prostatectomy	13
Survived prostatectomy	56
Received advice and nothing more	2

[1] Table VII in Julian Smith's paper.

Wilson Hey (1945) published an article which very strongly attracted my attention. I trust that I may be forgiven for quoting his opening remarks rather at length. I believe that they convey a message of profound importance, which is still striking rock in some places and not sinking in!

> Twenty-five years ago slow decompression became necessary because slow infection was necessary to allow time for immunization: rapid decompression with its rapid ascending infection killed. The chief virtue of the preliminary suprapubic tube and of the indwelling catheter was to cause infection and to permit the patient to develop his own immunity—if he could—before proceeding to prostatectomy. Immunization is of greater import than reduction of blood-urea because, as will be shown, post-operative uræmia is almost entirely the result of sepsis. Slow decompression is harmful because it must lead to infection even if it does not lead to the production of pyuria: moreover it is unnecessary. In over one hundred cases of chronic retention of urine, varying from one to five pints, I have in one minute decompressed the bladder aseptically without any ill effect. The subsequent rise in blood-urea after the rapid decompression in "aseptic prostatectomy" is less than the rise after slow decompression either by a catheter or a suprapubic tube.

Having noted in a large number of cases that with slow decompression the patients went through three phases of misery, I decided to try Hey's methods. The phases of misery were as follows: Firstly, for a few days the urine drained per catheter and the patients remained afebrile. They then went through a period of about two weeks, during which they were feverish, ill and miserable "with sweaty brow". They became debilitated and anæmic. Most then settled down, and after about three weeks were declared fit for prostatectomy. Some did not settle down and had to undergo a preliminary suprapubic cystotomy. Some of these had their cystotomies for a year or two waiting for the kidney function to improve. They then underwent the prostatectomy, and by slow degrees most crept back to health. The morbidity and mortality rates were high. I felt that all in all they could not be worse with immediate prostatectomy than if treated by these methods, and after consultation with my then senior, Dr. P. S. Messent (now Sir Philip Messent), I tried the method in a series of cases. The results were very satisfactory. For example, in one week we took four new prostatomegaly patients with acute retention of urine. I operated on two

on the day of their admission to hospital, and both left the hospital well and strong within about a fortnight, while the other two were still languishing with slow decompression.

CASE I.—In this case slow decompression was employed. A.McP., a male subject, aged seventy-four years, was admitted to hospital on May 1, 1947. He gave a history that six years previously he had had a stoppage of his urine and five years previously he had been put on the waiting list for a prostatectomy. For nine months he had had to pass urine about twelve times by night and day. He also had some difficulty in starting; the stream and volume were usually poor, but the stream had never suddenly stopped. For three months he had had bleeding from his penis on several occasions. Twelve hours before his admission to hospital the bleeding commenced again, and severe bleeding had occurred in the meantime. He had not passed urine for twelve hours, and had passed urine only in small dribbles for some time before this. His ankles swelled occasionally, but there was no other feature of significance in the history.

On examination, the patient was a rather obese old man lying in bed apparently in severe pain, and sweating. His pupils were very small and equal and did not react properly to light and accommodation. His teeth were in a poor condition, his tongue was clean but dry; examination of his neck revealed no abnormality, his heart sounds were normal and his blood pressure was 125 millimetres of mercury, systolic, and 85 millimetres, diastolic. Scattered rales were exhibited in his lungs. His pulse rate was 120 per minute; the pulse was regular and of normal rhythm. His bladder was distended to within one inch of the umbilicus, and on rectal examination his prostate was not grossly enlarged. Slight œdema of both feet was present. All attempts to pass an instrument *per urethram* and to drain the bladder were abortive, so that a suprapubic cystotomy was performed.

On May 4 suprapubic drainage was satisfactory; the patient's blood urea nitrate content was 102 milligrammes *per centum*, the urea concentration rose to 1·7% and his urine contained much pus and many coliform bacilli.

He was discharged from hospital on June 2, thirty-three days after admission, with his suprapubic cystotomy. His blood urea nitrogen level had fallen to 30 milligrammes *per centum*.

CASE II.—In this case also slow decompression was employed. R.W., aged seventy-three years, was admitted to the Royal Adelaide Hospital on May 1, 1947. He was an old age pensioner, who complained that he had been unable to pass his urine for three days: he had been able to pass only a few drops. He had never had any previous trouble with his urine, and usually passed it two to three times during the day and the same number of times at night. His appetite was poor, and his bowels acted with the aid of Epsom salts. He was a poor sleeper and his weight was constant. His only previous illnesses were rheumatics, and arthritis fourteen years previously and one year previously. There was nothing of note in the family history.

On examination, the patient was an old man lying in bed breathing heavily and in some distress. His temperature, pulse rate and respiration rate were normal. His pupils reacted equally to light and accommodation, he was edentulous, his tongue was furred, his fauces were slightly reddened and his lips were slightly blue. His neck was normal, and his heart sounds were normal. Scattered rhonchi were heard all over his lungs. His blood pressure was 100 millimetres of mercury, systolic, and 95 millimetres, diastolic. His bladder was distended up to his umbilicus and there was some tenderness up to the right costal margin. All his reflexes were normal. On rectal examination his prostate was smooth, grossly enlarged and protruding backwards into the rectum. A catheter was inserted and decompression was carried out, 40 ounces of urine being obtained. His blood urea nitrogen content was reported as being 26 milligrammes *per centum*. On May 4 drainage was satisfactory and a urea concentration test was undertaken; the figures obtained were as follows: first specimen, 2·1%; second specimen, 2·6%; third specimen, 3·0%; fourth specimen, 3·0%. Scattered rhonchi were still present all over both lungs, and by May 10 urinary culture produced a growth of *Bacterium coli*. On account of the patient's cyanosis and shortness of breath it was considered that he had some cardiac failure.

On May 16 a further urea concentration test was carried out, and with the following results: first specimen, 0·5%; second specimen, 1·3%; third specimen, 1·8%; fourth specimen, 1·8%.

Catheter drainage was continued, and further tests were ordered on May 24. The results of these were as follows. Examination of a centrifuged deposit of the urine with the high power of the microscope revealed the field to be crowded with leucocytes, amorphous phosphates and triple crystals. On examination of a direct smear, numerous Gram-negative bacilli and Gram-positive cocci in pairs, chains and clumps were seen to be present. Culture produced a growth of *B. coli, Proteus vulgaris* and *Streptococcus fæcalis*.

A urea concentration test on May 28 gave the following results: first specimen, 1·0%; second specimen, 1·2%; third specimen, 1·8%; fourth specimen, 2·0%.

On May 30 a suprapubic cystotomy was performed under local anæsthesia. The prostate was noted to be firm, with regular enlargement especially of the median lobe, and no other abnormality was detected in the bladder. Drainage from the cystotomy was satisfactory. There was some leakage around the tube at one stage.

On June 25 a further examination of the urine was made. Examination of the centrifuged deposit with the high power of the microscope showed the field to be packed with red blood cells and triple phosphate crystals. On examination of a direct smear, numerous Gram-negative bacilli and some Gram-positive cocci in pairs and chains were present.

The patient was discharged from hospital on June 29 after fifty-nine days in hospital, with his suprapubic drain functioning satisfactorily.

CASE III.—This was a case of prostatomegaly treated by immediate prostatectomy. R.H., aged seventy-two years, retired, was admitted to the Royal Adelaide Hospital on May 2, 1947, at 8 p.m. He gave a history that at 5 a.m. his bladder had been catheterized by an outside doctor. He had not passed urine for twenty to twenty-four hours. He had had great pain in the lower part of his abdomen and in his penis. He was admitted to hospital on May 2, and his bladder was immediately catheterized, as he had passed no urine since 5 a.m. His urine came away freely with no pain. He had no dyspnœa and no œdema of the feet. His appetite was good, but he had taken very little food since the onset of the pain. He slept well, but the pain kept him awake. He had had frequency of micturition for the last three or four years. His bowels were open regularly, but he was slightly constipated. He took an aperient once a week. He drank one pint of beer per day and smoked four ounces of tobacco per week. His only previous illness had occurred eight years previously, when a cataract was removed from his right eye. His wife was alive and well, and one child had died of typhoid fever; otherwise there was nothing of importance in his family history.

On examination, the patient was an elderly man lying in bed in no distress. His eyes reacted to light and accommodation, but his left eye could only distinguish light from dark. He was slightly deaf in both ears, the left more so than the right. He did not wear any teeth, his tongue was furred and his fauces were clean. No glands were palpable in his neck and there was no vascular engorgement. There was a sebaceous cyst on the left side of the neck. His heart sounds were faint but regular. In his lungs a few scattered sibilant rhonchi were heard in both fields posteriorly, especially at the base of the right lung. No mass or tenderness was detected in the abdomen. There was no œdema in the limbs, and his reflexes were normal, but his ankle jerks were not elicited.

A suprapubic modified Harris prostatectomy was performed on May 3. The prostate was grossly enlarged; it stripped readily from the capsule, but was rather friable in several places. There was considerable trabeculation of the bladder wall. The suprapubic wound was closed around a de Pezzer catheter without further drainage and the bladder was washed out until the returned fluid was clear.

On May 5 the de Pezzer tube was removed and the patient was comfortable. The urine was still a little blood-stained and the wound was gaping a little. Drainage from the urethral catheter was still satisfactory.

On May 15 the catheter was removed and his urine was clean. He passed urine freely after that and was allowed to get up on May 17. He was discharged from hospital on May 18, sixteen days after his admission.

The specimen of prostate was examined microscopically at the Institute of Medical and Veterinary Science and was found to be benign.

CASE IV.—This was another case of prostatomegaly treated by immediate prostatectomy. H.C., aged sixty-one years, employed as a stores officer, was admitted to the Royal Adelaide Hospital on May 2, 1947, at 9.30 a.m. He gave a history that he had been unable to pass urine that morning. He had last passed it at 5 p.m. the previous day. For several years he had had difficulty in starting micturition and in holding urine, and had had to get up two or three

times at night. The stream was good. He had had an attack of diarrhœa some days before his admission to hospital. His appetite was good, his bowels acted regularly, his weight was constant, and his general health was satisfactory. He had had shingles three years previously and carbuncles six years previously. There was nothing of importance in his family history.

On examination, the patient appeared as an elderly man complaining of pain in the abdomen and back. Examination of his eyes showed that both pupils reacted to light and accommodation; the left pupil appeared oval. His tongue was dry and furred; he had his own teeth, but they were in a poor condition. His lungs were clinically clear and his heart sounds were clear and regular. His blood pressure was 140 millimetres of mercury, systolic, and 90 millimetres, diastolic. The mid-line of the abdomen was dull, and the bladder, which extended to above the umbilicus, was tender. The prostate was enlarged and firm; the mid-line groove was not palpable.

The patient's bladder was catheterized with a large Jaques catheter, with slight difficulty. Slow decompression was employed.

A suprapubic modified Harris prostatectomy was performed on May 3. The prostate was grossly enlarged, stripping easily from the capsule. On macroscopic examination it appeared benign, and it proved to be benign on subsequent microscopic examination. A suprapubic de Pezzer tube was inserted and the wound was closed around it without any other drainage. The bladder was washed out until the return fluid was clear.

On May 6 the de Pezzer tube was removed. The urine was still blood-stained, but there were no clots. The wound appeared healthy. The patient felt well.

On May 15 the urethral catheter was removed and the patient thereafter passed urine freely; the urine was still slightly dirty. On May 17 he was allowed to sit out of bed, and he was discharged from hospital the following day, sixteen days after his admission to hospital. A specimen of urine was examined at the Institute of Medical and Veterinary Science. Examination of the centrifuged deposit with the high power of the microscope showed that the field was crowded with leucocytes and a few red blood cells. In a direct smear, there were many Gram-positive cocci in pairs and short chains and a few Gram-negative bacilli.

The Present Routine Management.

At the present time when a patient with benign prostatic obstruction is admitted to hospital the following routine is followed. If he is in a state of acute retention of urine his bladder is catheterized and the catheter is tied in. His general condition is properly assessed and his blood urea level is estimated. Provided that the blood urea level is not excessively high and the patient is reasonably active, it is considered that he is fit for prostatectomy. (No standard for "excessively high" has been fixed, but by that term is meant any figure above 40 to 50 milligrammes *per centum* of blood urea nitrogen.) This means in effect that almost no patients are refused prostatectomy on account of age, debility, heart disease, diabetes, cerebral vascular accidents *et cetera*. It is thought that in general the best hope for their relief and comfort lies in early prostatectomy. Antibiotics are administered, the urine is examined by culture and the patient is put on the next regular operating list. That means that he may have to wait a day or two, the object being to operate on him as soon as possible in order to get him over the operation before he has a chance to become ill through bed rest and sepsis.

Millin's operation is now performed as a routine procedure, and I here wish to present the statistics of the first 66 such cases in which I performed this operation at the Royal Adelaide Hospital. Ligation of the *vas deferens* has not been performed in any of the cases:

Total number of operations (all retropubic prostatectomy)	66
Number of deaths	3 (4·5%)
Number of patients with carcinoma diagnosed microscopically after operation	6
Average age of patients	70 years
Average duration of symptoms	2 years 5 months
Average pre-operative stay in hospital	6 days
Average post-operative stay in hospital	16 days
Average length of time after operation before patient was out of bed	8 days
Average length of time after operation before catheter was removed	5 days
Greatest number of days in hospital after operation	47
Least number of days in hospital after operation	6
Age of oldest patient	95 years
Age of youngest patient	52 years
Causes of post-operative death:	
Pulmonary embolism	1 case
Broncho-pneumonia	2 cases
Incontinence of urine	—
Stricture	1 case
Osteomyelitis of pubis	—
Permanent fistula	—

It is, of course, not claimed that such a series of cases could be free of complications. The following tabulation is a list of complications set down in the records written up by the resident medical officers:

Bleeding requiring reoperation	1 case
Post-operative shock	3 cases
Myocardial insufficiency	1 case
Diathermy burns on buttock	1 case
Suprapubic leak requiring reinsertion of catheter	7 cases
Gaping of wound	1 case
Paraphimosis	1 case
Pneumonia	7 cases
Anæmia	1 case
Epididymo-orchititis	1 case
Pulmonary embolism	1 case
Infection of wound	2 cases
Urinary infection	9 cases
Uræmia	2 cases
Auricular fibrillation	1 case
Urethritis	1 case
Atonic bladder	1 case
Bedsores	1 case
Hiccups	1 case

The ages of the patients who died were eighty, seventy-five and seventy-nine years respectively.

The method of Millin is not followed slavishly. Our own slight modifications are used as the cases require it. The anæsthetic of choice is the thiopentone, "Flaxedil", nitrous oxide and oxygen sequence. It is an extraordinary thing that there is still a difference of opinion about the choice of anæsthetics. I believe that if a properly skilled anæsthetist is available, the above-mentioned anæsthetic is by far the best. If an inexpert anæsthetist only is available, then some other anæsthetic such as ether may be found expedient.

Loftus, Dill, Clayton and Probert (1953) state that they prefer spinal analgesia confined to the sacral segments, with regional analgesia of the lower abdominal wall in order to diminish bleeding without depressing the systemic blood pressure. I have not found this type of anæsthesia helpful to me.

A catheter is fixed in the urethra and is usually removed on the third day. In most cases the urine is passed freely from then on. A tube is usually left in the cave of Retzius for five days purely as a safety valve. The patient is allowed up on the third day, and by the time he is due to have his sutures removed he is walking freely about the hospital and is ready to take a bath. Wound healing is generally very satisfactory and uncomplicated.

The rather high incidence (six cases out of 66) of carcinoma of the prostate discovered unexpectedly by histopathological examination of the material after prostatectomy brings me now to the final matter for consideration—that is, whether the present method should be abandoned and a total prostatectomy be performed in all such cases.

Fitzpatrick and Matheson (1951) describe 47 cases of total retropubic prostatectomy with four deaths and few complications, and express the view that total prostato-

vesiculectomy should be used in almost all cases in which enucleation would be considered suitable.

The feeling of most surgeons performing these operations is that there must be a median course. If all the cases of carcinoma are to be caught early, then the radical operation should be performed; but it has to be remembered that many of our patients are old, bed-ridden and debilitated, and are operated on only to aid their nursing. So long as their obstruction is relieved, and the nursing services are not satisfied with cystostomy, if they have carcinoma of the prostate it is likely that hormone therapy will carry them along until such time as their other infirmities will terminate their lives. The mortality of total prostatectomy, I believe, would be much higher than that of enucleation.

Let us see what some other authors think of the present choice of methods of dealing with prostatic obstruction.

Franzini and Bucci (1953) describe the functional and anatomical results controlled cystoscopically in a series of 73 Millin's prostatectomies. Almost all the patients in this material presented advanced stages of prostatic hypertrophy with emaciation and myocardial involvement. Five were aged between fifty and sixty years, 36 between sixty and seventy years, 26 between seventy and eighty years, and six were aged more than eighty years. There were eight deaths; however, in experimenting with the method, these authors selected patients for the operation who would have been adjudged inoperable by other methods. There were two deaths from hæmorrhage; these were the only ones which could be ascribed directly to the operation itself. The remaining mortality was that incident to the advanced age and frail physical condition of the patients.

The technique of the operation as performed by Franzini and Bucci was characterized by its simplicity. With the patient in an exaggerated Trendelenburg posture and under subdural anæsthesia, a mid-line incision was made, the space of Retzius was traversed, the capsule of the gland was split longitudinally and the adenoma was enucleated manually, without the aid of a finger inserted in the rectum and without any special attention as to how the urethra was lacerated. While the bladder neck was open, the finger was inserted into the bladder for exploratory purposes.

Before the wound was closed a permanent catheter was inserted into the bladder and a drainage tube was left in the space of Retzius. As a rule, the catheter was left in place longer than is generally reported (about ten days), and the patient remained in bed for a longer period (about thirteen days). In this clinical material—except with the two fatal cases of hæmorrhage—the authors had little trouble with bleeding.

The sulphonamides were used liberally; however, penicillin was given only if fever developed; only rarely was streptomycin, aureomycin or chloramphenicol used. After leaving the hospital the patient was encouraged to return for check-ups; in fact, 32 patients were reexamined with the cystoscope after a post-operative interval varying from thirty-nine days to eighteen months. In only two cases was it impossible to introduce the cystoscope.

At the time of this examination the capacity of the bladder was somewhat reduced (150 to 200 cubic centimetres), a demonstration of the absence of difficulty in urinating. The internal conformation of the bladder was at this time fairly normal; a retracting scar as seen after the Freyer operation was absent, and there was in no instance any evidence of the trabeculation which in these advanced cases is always very noticeable in the pre-operative period. In two instances small stones were uncovered in the bladder; these had evidently formed since the operation. In the withdrawing of the cystoscope the condition of the urethra was noted. Usually a fusiform dilatation of the deep urethra was found; however, in three instances the calibre of the urethra appeared to be normal throughout. There was no trace of ulceration or other evidence of lack of continuity of the mucosal covering of the canal. Frequently in rectal palpation a hard lump was discovered in the region of the previous prostatic adenoma; it was about chestnut-sized and was ascribed to the contracted, shrivelled capsule of the gland.

Franzini and Bucci regard Millin's operation as simple and safe, and believe that it permits operation in instances in which other methods would be contraindicated.

Hess, Roth and Kaminsky (1952) state that there are few subjects in the realm of urology which are as dear to the heart of the urologist as benign obstructive enlargement of the prostate gland, and that we seem powerless to reverse the process by physical, chemical or biological means, so that we must content ourselves with the time-honoured method of surgical ablation of the obstruction. They mention that a paper has recently been presented to the American Urological Association on Infrapubic Prostatectomy, so that a fifth standard method may soon be added to the four already in vogue. In any case they claim that in their clinic there are four good operations from which to choose in any given case. The patient, they state, has little concern with how we go about getting him well. He hopes to live through the procedure, to be cured, and to pass urine freely, forcefully and with pleasure rather than with pain. He hopes to be free from the necessities of sounds and bougies, irrigations and instillations, and from the threat of second sittings. These authors finally mention that the young surgeon learning the technique of resection will rupture a few bladders or extirpate a few external sphincters, that the perineal operator will end up in the rectum more than once, or the transvesical operator open the peritoneum and the retropubic specialist not go unscathed. Their analyses of series of cases has led them to abate their enthusiasm for endoscopic resection, and to increase their respect for clean, open operation, preferably under direct vision, although their impressions do not constitute a condemnation of any one of the four standard techniques. The authors mention that they have many cases of persistent prostatic obstruction, and the overwhelming majority of their problems on that score arise in patients who have undergone resection, and that stricture of the urethra is predominantly a complication of resection.

Harrison and Poutasse (1950) publish a long article on the choice of operative approach for prostatectomy. They consider the merits, difficulties and dangers of all the standard methods and find some good for all. They hold that each approach has a definite place in the therapeutic armamentarium, and that the operation chosen must be that most suitable for the individual patient.

Higgins (1947) reviews 395 cases in which operation was performed from January, 1944, to December, 1945. After an extensive analysis his conclusions were as follows: (i) Medical consultation is essential to maintain a low operative mortality, and should be directed chiefly toward the cardio-vascular system. (ii) Eighty-five to 90% of patients with prostatic obstruction can be completely relieved of symptoms by transurethral resection. His mortality rate was 2·02%.

Summary.

The subject of the treatment of benign prostatic obstruction is reviewed from an historical angle. A series of 66 cases of prostatic obstruction in which operation was performed in the belief that they were of benign origin has been presented. Almost no selection of patients has been made, all who were admitted to hospital being dealt with, and it is believed that by early operation by Millin's method, early removal of the catheter and early ambulation the mortality and morbidity rates can be minimized, and the misery of bed-ridden, "septic" old men can be avoided. In all humility, although I have no new message, I feel that only by a periodic study and check-up of our own work can advancement be achieved.

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SOME ASPECTS OF ANÆSTHESIA IN ABDOMINAL SURGERY.[1]

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ANY discussion of anæsthetic technique involves three individuals: patient, surgeon and anæsthetist. The two latter constitute a team whose object is the welfare and safety of the patient. It is only by mutual trust and cooperation between the members of the team and their assistants that technical difficulties, often considerable, may be overcome.

Modern anæsthesia may be considered to have three facets: hypnosis, analgesia and muscular relaxation, the last-mentioned in particular varying with the nature of the surgery. In the past the three elements were usually provided by one drug, commonly ether, the skilful use of which at different anæsthetic levels produced the desired effects.

Exploitation of the various drugs acting at the myo-neural junction soon showed that deep anæsthesia was not the invariable accompaniment of muscle relaxation, and by the combination of different agents a balanced form of anæsthesia was achieved.

In abdominal surgery quiet respiration and adequate muscular relaxation are essential. What is also of paramount importance is the rapid return of post-operative consciousness implying minimal respiratory depression and early movement, both outstanding factors in the avoidance of chest complications. Anæsthesia may be achieved in one or more of the four following ways: (i) By the method already mentioned, in which sleep is induced by a small dose of "Pentothal", analgesia with nitrous oxide and oxygen sometimes reinforced by some other agent, and relaxation by one or more of the substances interrupting myo-neural transmission. (ii) By the use of ether alone or predominating in some anæsthetic mixture. (iii) By spinal anæsthesia in which sensory, motor and sympathetic roots are paralysed in the subarachnoid space. (iv) By local anæsthesia.

With spinal and local techniques sleep may be advantageously provided by "Pentothal".

In surgery of the upper part of the abdomen a cuffed endotracheal tube is usually desirable, respiration being controlled if and when necessary. With respiration merely aided and not controlled, even if operating conditions are ideal, diminished tidal volume may permit the accumulation of carbon dioxide with adequate oxygenation. Also, it is only when control is complete that intentional immobility of the diaphragm and adjacent structures can be arranged to suit surgical requirements. This may be a great help in operations like the cure of a hiatus hernia, œsophageal resection and others in which the thoraco-abdominal approach is used.

It is usual for intubation to be performed after administration of a small dose of "Pentothal", 0·3 to 0·5 gramme, combined with or quickly followed by one of the relaxants. This may be succinyl-choline chloride ("Scoline") 50 to 100 milligrammes, decamethonium iodide ("Eulissin" or "Syncurine") 5·0 milligrammes, gallamine tri-ethiodide ("Flaxedil") 80 to 100 milligrammes, or d-tubocurarine chloride ("Tubarine") 15 to 20 milligrammes. It is often undesirable to repeat doses of depolarizing relaxants whose action is not reversed by "Prostigmin", namely "Eulissin" and "Scoline", though the effect of the latter is usually so transient that cumulation is rare. After the introduction of the tube, which commonly excites some slight laryngeal activity, more relaxant is given and the patient is overventilated to remove carbon dioxide and reduce the respiratory stimulus. This usually provides optimum conditions for opening the peritoneum and the necessary exploration, the mobilization of the organ for removal, and the insertion of sponges and retractors. There are possible objections to the combination of profound muscle relaxation with light anæsthesia. One of these is the likelihood of shock from noxious stimuli. A considerable fall of blood pressure is an almost invariable accompaniment to the stimulus of mesenteric traction occurring early in most abdominal operations and is well shown when the stomach is mobilized preparatory to resection. This hypotension of up to 40 millimetres of mercury or more seems to be independent of the type of anæsthetic but is usually transient and of little importance.

The preponderance of relaxation over hypnosis permitting a patient, while still paralysed, to break through the barrier of consciousness is a potential risk and has been known to occur, but it must be very rare.

There appears to be a definite association between the control of respiration implying low carbon dioxide levels, muscle relaxation and sedation, and the maintenance of unconsciousness. As has been abundantly proved in different experiments with relaxants, none has been shown when injected into conscious human beings to have any anæsthetic effects. However, one cannot but be fascinated by the action of "Prostigmin" following the use of "Flaxedil" or "Tubarine". At one moment the patient is relaxed, apnœic and unconscious, completely dependent for survival upon the anæsthetist, who must inflate his lungs with oxygen. Within two or three minutes relaxation has utterly vanished, the patient is breathing strongly and trying to remove his endotracheal tube, and he usually speaks or coughs as soon as this is done. There can be no doubt that when anæsthesia is established in the manner discussed it may be maintained for long periods by nothing more than gas and oxygen, perhaps reinforced by pethidine and muscle relaxants. In many cases the addition of a small quantity of ether to the anæsthetic mixture during the first few minutes not only assists the induction but makes subsequent doses of "Tubarine" doubly effective. A small dose of "Scoline" for difficult peritoneal closure, in cases in which the effect of previous relaxants has completely vanished, is often a great help to the surgeon. This renders unnecessary the terminal dose of "Pentothal", which may confer good operating conditions while deferring by hours the return to consciousness. An important asset in this technique is the diminished risk of explosion, which is very important with the almost universal use of diathermy.

For operations on the lower part of the abdomen, intubation is not commonly necessary, except for the very fat patient, or for affairs of great magnitude like the Wertheim operation or abdomino-perineal resection of the rectum. In such instances the effects of a steep tilt, added to those of sponges and abdominal contents pressed against the diaphragm, may seriously jeopardize cardio-respiratory function. One of the conditions in which abolition of spontaneous respiration is most undesirable is in the subject suffering from chronic bronchitis and emphysema. In such

[1] Read at a meeting of the New South Wales Branch of the British Medical Association, September 24, 1953.

a case the great diminution of pulmonary elasticity and rigidity of the thoracic cage make it almost impossible to simulate normal respiration by squeezing a rebreathing bag. It may seem contradictory to recommend the use of an irritant such as ether when signs of bronchitis already exist. The method in the apparent madness lies in the control of laryngo-bronchial reflexes, which seem particularly active in such patients. Tracheal intubation may precipitate severe laryngospasm, and also prolonged bronchospasm. Ether and oxygen will often provide good operating conditions with quiet spontaneous respiration.

The actual choice of relaxant depends on the taste of the anæsthetist. "Flaxedil" is easily miscible with "Pentothal", and its effects last for about twenty minutes and are reversed by "Prostigmin". It causes tachycardia, however, which may help to obscure the patient's true condition. "Eulissin" or "Syncurine" is also miscible with "Pentothal" and gives profound though not so prolonged relaxation. Its main use is during the early stages of anæsthesia, as the effective duration of repeated doses is hard to assess, and one may be left at the end of an operation with a patient in almost complete apnœa, which time alone will abolish. "Scoline" gives the most profound relaxation, commonly of very short duration. It is extremely useful for the purpose of intubation, but one must be ready at very short notice to give the patient ether or some other relaxant, or to repeat the "Scoline". "Scoline" in an intravenous drip administration may also be used throughout the operation as the sole relaxant.

When ether is used as the main agent, alone or in combination, it is essential to reach third plane anæsthesia as rapidly and smoothly as possible for intubation and the opening of the peritoneum, as this plane is essential for the introduction of sponges and retractors. Maintenance should be at a much lighter anæsthetic level, and this is simplified by the use of a gas-oxygen machine which permits the delivery of a fixed percentage of ether, thereby minimizing the risk of fluctuating anæsthetic levels. For closure it is essential that the anæsthesia be deepened temporarily to the stage of partial intercostal paralysis, in the upper part of the abdomen at least. When the operation is of short duration such etherization is relatively harmless, but hypotension and hypoglycæmia follow prolonged third plane anæsthesia with a considerable increase of post-anæsthetic vomiting and an undesirable prolongation of post-operative sleep. In some cases deep ether anæsthesia results in jerky shallow respiration associated with a good deal of abdominal movement. Surgeons may complain under such conditions that the patient is "pushing" and demand deeper anæsthesia, but anæsthesia at a lighter level with more coordinated respiration is the wiser choice.

Many surgeons are convinced that the benefits conferred by spinal anæsthesia completely transcend those of any other technique, and confidently request its use in such conditions as intestinal obstruction. Good surgical access and retention of consciousness in guarding against the inhalation of regurgitated fluid are not lightly to be abandoned, but may be obtained at the cost of the patient's life for other reasons. No sound clinical indication of the blood volume under such conditions is obtainable, and the oligæmia from vomiting and segregation of fluid in the obstructed loop may be completely masked by the various compensatory mechanisms, which may, however, disappear with alarming suddenness under the vasodilating effect of the spinal anæsthetic. The patient may easily, in such conditions, die of oligæmic shock in a very short time. When such a state is suspected, it is wiser to improve the blood volume by the use of blood or serum and to give a non-toxic anæsthetic with relaxants. If the stomach is not empty, however, this may produce a torrent of gastric contents, which kills by aspiration or laryngeal spasm. It is often wiser to follow the barest minimum of "Pentothal" with ether for the introduction of a tracheal tube before the use of relaxants.

Retention of consciousness may be a nightmare for the patient. Even with completely successful anæsthesia the use of a steep tilt with abdomino-perineal resection of the rectum, or the lateral position with a lumbar rest in some urological surgery, can be profoundly uncomfortable. Generous premedication is therefore essential, and "Omnopon", one-third grain given intravenously at the beginning of the operation, with or without small subsequent doses of thiopentone, helps to reinforce earlier sedation.

Local anæsthesia has, I think, a limited though important place in abdominal surgery. As is common with the use of extensive local anæsthetic procedures in general, adequate premedication followed by closely integrated techniques is essential for the best results. These techniques are as follows: (i) Blocking of nerve trunks, as in bilateral or unilateral intercostal block. (ii) Field block or the laying down of barriers of local anæsthetic with consequent temporary interruption of transmission of nerve impulses in that area. (iii) Infiltration of the skin in the site of the incision and the parts underlying it. (iv) Splanchnic block or the infiltration of the area of the appropriate ganglionic supply.

Local anæsthesia is extremely valuable for a very ill patient, but it has one serious drawback, and that is that it is almost impossible to obtain sufficient relaxation to permit efficient abdominal exploration when the diagnosis is in doubt.

The drugs most commonly used are procaine, amethocaine and "Xylocaine". Procaine may be used in percentages ranging from 2·0 to 0·5, the total amount used being limited preferably to 1·0 gramme. This lasts for about an hour. If longer anæsthesia is required, amethocaine hydrochloride is used, ranging in strength from 1:1000 to 1:4000, the upper dosage limit being 150 to 200 milligrammes. The most efficient of all is "Xylocaine", a recent introduction from Sweden, used in percentages comparable with those for procaine, or even as low as 0·25% for infiltration. With a limit of one gramme, toxic manifestations are extremely rare. This drug combines an effective duration of up to three hours with a euphoriant effect which is highly satisfactory.

I have said nothing about the use of hypotensive drugs, as I have little experience of them and none at all in abdominal surgery. It seems possible that this technique may have an important place in such operations as abdomino-perineal excision of the rectum and other extensive pelvic procedures usually associated with profound blood loss. Spinal anæsthesia, not necessarily total, is usually followed by a fall of blood pressure to about 80 millimetres of mercury if pressor drugs are withheld, and this fall affords excellent operating conditions when combined with the relaxation. It is most important, of course, to replace blood lost and thereby avoid the oligæmic factor in hypotension. Much might be said about resuscitation, with blood volume maintenance during surgery. The average patient can lose up to one litre of blood without any apparent ill effect. A similar loss in such a patient, or one oligæmic, say, from extensive burns or long-standing intestinal obstruction, will produce immediately signs of profound shock, alleviated only by rapid infusion of blood or some plasma-sparing preparation.

It is most important that we should try, therefore, to be always prepared.

ANÆSTHESIA IN ABDOMINAL SURGERY: THE MUTUAL PROBLEMS OF THE ANÆSTHETIST AND THE SURGEON.[1]

By V. M. COPPLESON,
Sydney.

MODERN SURGERY requires good organization, and usually the better the organization, the better the surgery. At the same time, operative surgery is coming to depend more upon the performance of groups or teams than of single individuals. With well-trained, experienced and well-equipped teams, surgery and anæsthesia are able to reach high standards. In these teams the anæsthetist should play

[1] Read at a meeting of the New South Wales Branch of the British Medical Association, September 24, 1953.

a leading part at all stages, including the pre-operative and post-operative management. The time has passed when major surgery can depend upon the casual anæsthetist, whose association with the patient begins and ends with the administration of the anæsthetic. On the contrary, many operations and types of surgery nowadays need not only the regular anæsthetist but in addition one or more assistant anæsthetists.

As Dr. McCulloch has said, anæsthesia aims to meet the special problems of abdominal surgery by fulfilling three main objectives — analgesia, narcosis and relaxation. Oxygen is used more freely than formerly. Lately, methods employing apnœa have been introduced, more recently attempts are being made through controlled hypotension to supply a bloodless field for the surgeon, whilst premedication is now established as a routine.

In the selection of the anæsthetic and the method of anæsthesia the anæsthetist should as far as possible meet the wishes of the surgeon and the patient. Different anæsthetics suit different surgeons, and in many instances a surgeon's time and technique in particular operations are related to particular methods of anæsthesia. In the final analysis the anæsthetist, his skill and his experience are of greater importance than the actual anæsthetic agent.

Ether still remains the sheet anchor of anæsthesia for abdominal surgery. The most satisfactory combination from all points of view is undoubtedly the thiopentone-ether sequence with oxygen and possibly the addition, when necessary, of a suitable relaxant. Thiopentone alone is suitable only for short or minor procedures, whilst the anæsthetic gases have no place in abdominal surgery, as they not only give inadequate relaxation but cause excessive and troublesome bleeding.

Dr. McCulloch has spoken to you about local anæsthesia. It has its adherents, even for quite major operations, but most surgeons consider that its scope of usefulness is limited to comparatively minor procedures, and that it is contraindicated in acute abdominal surgery.

Spinal anæsthesia is supposed to have some virtue in intestinal obstruction. The spinal anæsthetics, however, are generally unpopular with patients, and the high spinal has few adherents. The mid-spinal anæsthetic with heavy "Percaine", administered by a skilled anæsthetist, is a most efficient anæsthetic for lower abdominal operations. It is the first choice for abdomino-perineal resection of the rectum and similar operations. With premedication sufficiently heavy to put the patient into a deep sleep it combines relaxation with sufficient hypotension to give ideal operating conditions (Figure I).

The relaxant drugs are proving very useful, especially in the surgery of the upper part of the abdomen; but unless they are expertly given, they are apt to cause profuse hæmorrhage. This is in part due to the action of the relaxant on the muscles of respiration. These drugs should not be given unless oxygen and some form of assistance to respiration are available. This interference with respiration calls for particular caution in the use of relaxants when the patient is in the Trendelenburg position, and all patients on whom they are used must be watched very carefully, in the immediate post-operative period particularly, to ensure that they have adequate pulmonary ventilation.

In abdominal surgery some respiratory activity is advisable with most abdominal operations, and there is little indication for the use of apnœa except in those operations on the upper part of the abdomen which are likely to be extended to the chest.

Bleeding is always a worry to the surgeon. It obscures the operation field and leads to shock. Hæmatomata in wounds delay healing, predispose to sepsis, thrombosis and embolism and make drainage necessary. Any contribution to the control of bleeding by the anæsthetist is welcome, and controlled hypotension by the methonium compounds is the closest approach yet realized to his dream of self-sealing blood vessels. Unfortunately, the incidence of post-operative complications, such as post-operative bleeding, hæmatoma, embolism and even cerebral complications, is so high that most surgeons favour less dangerous, although less effective, methods.

If surgeons of an earlier generation were able to view a modern operation, the feature which would be most likely to excite their interest is the degree of control of shock in the operative and post-operative phases. This has been achieved by a better understanding of the therapy of blood loss and of fluid and electrolyte balance, and the use of intragastric and other tubes.

In the presence of severe blood loss, such as massive upper abdominal hæmorrhage, anæsthesia often calls for great skill and judgement.

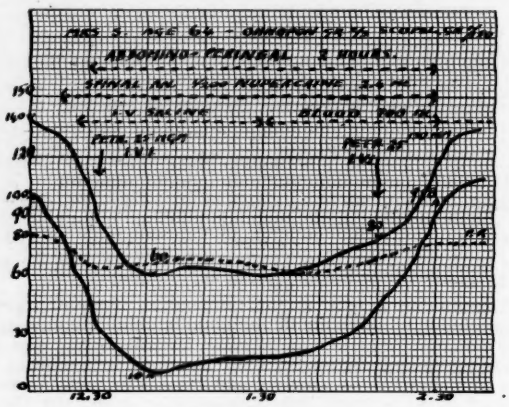

FIGURE I.
Chart illustrating controlled hypotension in spinal anæsthesia with heavy "Percaine" without the use of ephedrine for an abdomino-perineal resection of the rectum. (By courtesy of Dr. L. Shea.)

Whole blood itself is undoubtedly best to replace lost blood. Serum should rarely, if ever, be used. The threat of homologous serum jaundice after its use is very serious. Packed corpuscles are preferable to whole blood when the desire is to restore hæmoglobin rather than to replace blood lost. Where blood is required before operation, the question of when it should best be given is important. If the quantity required is not great, its administration should be left until the time of operation and started immediately the anæsthetic is given, or it may be begun about twelve to thirty-six hours before operation. In spite of theoretical advantages to the contrary, it is not desirable, if possible, to leave an interval of some days between the transfusion and the operation, as the occurrence of an allergic or pyrogenic reaction with the first transfusion makes the problem of the transfusion required for the operation more difficult. Red blood cell counts and hæmoglobin estimations are at best only rough guides in the early stages of blood loss. Clinical judgement in these cases is most important, and the colour of the patient's lips is a valuable guide. During operation the amount of blood to be replaced should largely be determined by observation of the actual blood loss. In general, during operation a fall in blood pressure with an increase in pulse rate is an indication for more blood, whilst a rise in blood pressure with slowing of the pulse calls for slowing of the rate of flow or cessation of the transfusion. A raised blood pressure and distension of the superficial veins of the arm or the external jugulars may indicate an overloading of the vascular system, which, if it persists, is likely to lead to cardiac arrest. Other indications of overloading are signs of pulmonary œdema, failure of the veins of the forearm to collapse when the arm is raised and, in conscious patients, feelings of oppression in the chest.

Much progress has been made in the use of intravenous fluid therapy. Its use involves the availability of tests which are readily obtainable only in large institutions. When methods of accurate determination of electrolytes

are not available, the solution of 4% glucose in one-fifth normal saline is the least dangerous and the most generally useful of all fluids for intravenous use. After major operations on the upper part of the abdomen and œsophagus, many of the temporary difficulties of intake in the early post-operative period can be forestalled by the performance of a well-executed jejunostomy. It is a valuable adjunct to these operations, which does not receive the attention it deserves.

Intragastric and other tubes are required for all patients who are vomiting, and particularly for those with intestinal obstruction, dilated stomachs or abdominal distension; it is essential that a cuffed tube be passed into the larynx, as sudden drowning of the patient by the contents of the stomach is apt to occur and is a common cause of death of these patients on the table. The fluid may be vomited, but more often it is forced out of a dilated stomach in a sudden gush by the surgeon's hand exploring the left upper quadrant of the abdomen and completely overwhelms the unfortunate patient. In all of these cases and in cases of pyloric stenosis the stomach should be emptied by stomach tube before operation and the tube left *in situ*. Sometimes it is necessary to pass a tube into the stomach of an anæsthetized patient. This is best done through a Magill's tube. If a patient is anæsthetized with an intestinal tube with an end balloon in place, it is essential to deflate the balloon before administration of the anæsthetic is begun or preferably to remove the tube.

The Magill and other intratracheal tubes when properly used may be of great value. Nevertheless, as a rule, the simplest procedure possible is usually the best, and there is no doubt, particularly in public hospital practice, that complicated procedures and methods of anæsthesia are often undertaken when simpler methods would suffice. Ineffectual and persistent efforts to intubate the larynx by inexperienced anæsthetists cause a great and often unnecessary stress on the patient, which takes its toll in the post-operative phase. The recent work on the electrocardiographic changes accompanying intubation and detubation provides much food for thought.

The ability of surgeons and anæsthetists to meet and prevent complications varies with their professional ability and skill. Special attention in pre-operative care is needed for the aged, diabetics and those with cardio-vascular disease. Recent work has confirmed the great value of atropine in premedication, and it should be given routinely to all patients before anæsthesia.

The main complications related to anæsthesia in abdominal surgery are respiratory complications, post-operative pain, vomiting, retention of urine, disruption of the wound, post-operative hernia, and post-operative hæmatomata, thrombosis and embolism.

In general, patients who have had bad anæsthetics or have taken them badly, have bad post-operative courses, and patients with whom there has been difficulty in inserting tubes into the larynx or who have been permitted to become blue and anoxæmic during the operation are always candidates for respiratory complications. Much can be done by the anæsthetist before the patient leaves the theatre to prevent post-operative atelectasis. The patient should not be allowed to return to bed full of mucus, which should be sucked out in the theatre by means of bronchoscopy if necessary. Early post-operative ambulation is advisable in these cases where possible.

Disruption of the wound and post-operative hernia are related to post-operative vomiting and coughing. Vomiting when persistent should be controlled by an indwelling intragastric tube with its usual accompaniment of intravenous fluid therapy.

Post-operative retention of urine is probably more common after spinal than other anæsthetics. It should not be allowed to persist, and patients' bladders should be immediately catheterized.

Germane to this subject is the recent advocacy of long-acting local anæsthetics for injection in the vicinity of the wound to prevent immediate post-operative pain. Whilst the prevention of pain is highly desirable, it is doubtful whether, in principle, the elimination of the reflex which protects a healing wound so that its safety is entirely dependent on its sutures is equally desirable. There are reports that some of those who originally used "Efocaine", which has been widely advocated for this purpose, have discontinued it owing to persistent pain at the site of injection, whilst even more serious remote effects on the nervous system, such as transverse myelitis, have been reported.

The patient who remains deeply unconscious for long periods after his return to bed places a great responsibility upon the nursing staff, whilst the special vigilance needed after the use of the relaxants has already been mentioned.

Anæsthesia has advanced rapidly within the past decade, and it is conceivable that we are on the eve of still greater advances. The field is one admirably suited to electronics, and in this regard the work on automatic anæsthesia is most fascinating. Machines already play a large part in anæsthesia. They are notoriously accurate and constantly alert, and they do not tire. It requires no great stretch of the imagination to believe that these machines in the not too distant future will play a part in anæsthesia analogous to that of the automatic pilot in flying. Clinical impressions in anæsthesia are rapidly giving way to more accurate and scientific methods, and the time has long since arrived when equipment to provide electrocardiographic, electroencephalographic and respiratory charts should be part of the permanent equipment of every major operating theatre.

Reviews.

Recurrent Dislocation of the Shoulder. By James A. Dickson, M.D., Alfred W. Humphries, M.D., and Harry W. O'Dell, M.D.; 1953. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9½" x 6", pp. 164, with 78 illustrations. Price: £2 8s. 6d.

IN their foreword the authors state that "this compendium has been arranged to facilitate a clearer understanding of the factors involved in recurrent dislocation of the shoulder. By compiling all the known data and making this information readily accessible in a concrete form we hope to stimulate a better understanding and, ultimately, better treatment of this condition". This book is essentially a summary of published articles on a condition which has already been dealt with exhaustively in recent surgical literature. There is little that is new in the authors' observations, and the 78 whole-page illustrations are reproduced (with due acknowledgement) almost entirely from previous publications. Perhaps the most satisfactory section of the monograph is that devoted to the pathology of the condition.

In the section on treatment, a number of standard operations are described, but few orthopædic surgeons would agree that "in the present state of our knowledge it would be unwise to recommend any particular surgical technique as superior or to be preferred to all others in the management of a given case". This statement, however, is qualified by the brief observation that the general consensus of opinion seems to be that some limitation of external rotation is essential to correct habitual dislocation of the shoulder. A lengthy bibliography completes the volume.

Studiem am Menschlichen Sperma. By Charles A. Joël; 1953. Basel: Benno Schwabe and Company, 8½" x 6", pp. 204, with 66 illustrations. Price: Swiss francs 28.

IN the second edition of his book, "Researches on Human Seminal Fluid", now enlarged and improved, Dr. Joël, of Tel Aviv, presents us not with a text-book or even guide to the study of the subject but with the conclusions of his own extensive researches. Nearly one quarter of the book is devoted to the history of seminology, and admirable this exposition certainly is; indeed if there was nothing else in the volume it would be welcome; but there is much else making this second edition valuable. At one time a childless marriage was held to be conditioned by some reproductive incapacity in the wife, but of late the possibility of the husband being the cause has come to the front, and it is precisely this problem to which Dr. Joël has directed his investigations. If in a community, race or nation the average number of children in the family is only two, then such community, race or nation will be extinct in 200 years. As more than 10% of marriages are childless and as economic

and possibly some social factors no longer permit large families in the 90% which are blessed with children, the problem of reducing this 10% sterility has a marked social complexion. Dr. Joël has used the latest technique in his histological examination of spermatozoa employing the electron microscope with a magnification of some 9000. The variations in shape of the spermatozoa are surprisingly great; some of these are physiological and of little significance; some are pathological, making impregnation of the ovum impossible. Each of the several portions of the spermatozoon is liable to variation, whilst double heads or double tails are not uncommon. Amongst points of interest the following may be mentioned. Dr. Joël rejects the condom method of obtaining ejaculate for investigation; he holds that the powder always present, starch, talc or lycopodium, as well as traces of rubber solvent, injure the spermatozoa. Cold is less inimical to spermatozoic activity than warmth. In the transport of ejaculate Dr. Joël uses dry ice in a sort of thermos flask; the spermatozoa are thawed in a water bath at 20° C. without any loss of motility; on the other hand, warmth, even that of the air in tropical climates, can readily lead to total loss of activity, and this fact has led some investigators to see in the descent of the testes a device for shielding the thermolabile spermatozoa and their cellular precursors from injurous heat. Spermatozoa have a much longer life in the cervix than in the vagina, and it is the cervix with Dr. Joël regards as the true reservoir. A final warning is uttered that it is wrong to place exclusive emphasis on motility or number or morphology of spermatozoa in assessing infertility—all conditions must be taken together and a proper integration effected. There is a good bibliography but no index. The illustrations are of excellent quality.

Clinical Obstetrics. By Members of the Staff of the Pennsylvania Hospital, edited by Clifford B. Lull, M.D., and Robert A. Kimbrough, M.D.; 1953. Philadelphia: J. B. Lippincott Company. Sydney: Angus and Robertson, Limited. 10½" × 7½", pp. 756, with 392 illustrations and eight plates in colour. Price: £5 7s. 6d.

THIS book, by Lull and Kimbrough, is an organized record of practice in the Division of Obstetrics and Gynecology of the Pennsylvania Hospital, skilfully presented in text-book form. Contributions from 20 experts—members of the hospital staff and an attorney at law—are combined to produce an attractive volume suitable for study and reference, particularly by the general practitioner and young obstetrician. The grouping of subjects is a departure from that of the usual text-book, but it is in conformity with the general practical outlook of the authors. The opening chapters on the anatomy and physiology of reproduction deal also with embryology, abnormalities of the genital tract, endocrinology and fertility. Under "Normal Pregnancy" is found a presentation of the signs and symptoms of pregnancy, clinical laboratory methods in obstetrics, antenatal care and management, and nutrition and nutritional disturbances in pregnancy. The section on complications of pregnancy is a clear and concise symposium by seven authors on the hæmorrhages of pregnancy and labour, toxæmias, medical and surgical complications, obstetric radiology and the pathology of pregnancy and labour. Then follow sections on normal labour (including methods of analgesia and anæsthesia), abnormal labour, operative obstetrics, puerperal period, the newborn (embracing resuscitation, breast and artificial feeding, nursery management and hæmolytic disease) and other aspects, which include maternal and infant mortality, nursing procedures and legal aspects of obstetric practice.

This serves to show the comprehensive scope of the work which without any doubt will be widely approved. Adverse criticism must be minimal. Perhaps the statement that "It is our opinion that the so-called toxæmias of pregnancy are in reality a nutritional deficiency state" is not the whole truth, though surely part of the truth; but the assertion that "a patient in optimum health, fully meeting the demands of pregnancy, will maintain a blood pressure of 120/70" invites a query. Illustrations are abundant and excellent, while the exclusively American bibliography is adequate.

A Doctor's Soliloquy. By Joseph Hayyim Krimsky; 1953. New York: Philosophical Library. 8" × 5½", pp. 130. Price: $2.75.

THE author's "confessio fidei" is convincingly portrayed in a short soliloquy divided into thirty-seven sections which are condensed in a foreword. They record a quest for the values and verities of life, religion and science. His purpose has been to formulate a religious view of the world built around the basic premise of the essential oneness of life, the universe and God. He defines religion as "a way of life towards the goal of godliness". It is the expression of the finest moral and spiritual aspirations common to all the great religions which proclaim faith in God. The book calls to mind the "Soliloquy of Alexander Selkirk". Here we find the lines:

> Religion! What treasure untold
> Resides in that heavenly word!
> More precious than silver and gold
> Or all that this earth can afford.

They reinforce the stress laid by Dr. Krimsky on the value of religion.

The acceptance of the facts and figures that science has revealed does not supply all the answers, capable as the revelation is of affording the means for a better and more abundant life.

The author insists that there must also be faith in things unseen by mortal eyes. In his musings the author surveys some of the wonders of creation and of evolution. He scorns the belief that they are the result of blind chance. In support he quotes Darwin:

> There is a grandeur in this view of life with its several powers having been originally breathed by the Creator into a few forms or into one; and that while this planet has gone cycling on according to the fixed laws of gravity, from so simple a beginning endless forms, most beautiful and most wonderful, have been and are being evolved.

And the Psalmist lends his authority, too:

> The heavens declare the glory of God; and the firmament sheweth his handywork. Day unto day uttereth speech, and night unto night sheweth knowledge.

As might be expected when a man is talking to himself on a theme dear to him, there is a good deal of repetition. But he is never dull. One's desire to read on is whetted by his apposite quotations from great writers of the past interspersed in the soliloquy.

To those who desire to reconcile science and religion, this book is commended without stint. The good print adds to the pleasure of the perusal, but the printer's errors, six in the first nine pages, detract from it.

Medicine. Edited by Hugh G. Garland, T.D., M.D., F.R.C.P., and William Phillips, M.D., B.Sc., F.R.C.P., with a foreword by F. A. E. Crew, T.D., M.D., D.Sc., Ph.D., F.R.S.; 1953. London: Macmillan and Company, Limited. In two volumes. 10" × 7", pp. 2178, with 238 illustrations. Price: £6.

THE publication of a new text-book of medicine—new alike in authorship and scope—is a rare event. The title "Medicine" is interpreted in a wide sense, for in the two volumes the editors have not only covered the subject from the more conventional aspects system by system, but have also discussed at length constitutional, inherited and environmental factors contributing to disease. The result is a very readable but quite lengthy dissertation on all aspects of internal medicine. It is easy to see in this approach the change that has come over our attitude towards the sick man—the definition of health as a positive state of well-being the absence of which calls for a careful investigation of underlying causes as well as the solution of the immediate diagnostic problem. This is British medicine at its best. The student who has mastered the teachings of these two volumes is well equipped to practise as a family physician.

Some of the subjects covered in the earlier sections are usually included in the preclinical phase of the medical curriculum. For example, "Genetic Factors in Disease" forms part of the study of biology. Most clinical teachers, however, would agree that very few students seem capable of integrating information presented to them in the earlier years with the needs of their clinical studies, so a restatement of such information is not amiss. The inclusion of such material also enhances the value of the book to graduates, for it systematizes much that is learned by experience.

The two editors are experienced teachers. Hugh G. Garland is senior lecturer in neurology, University of Leeds, and physician in charge, Department of Neurology, General Infirmary of Leeds. William Phillips is senior clinical teacher in medicine, Welsh National School of Medicine, and senior physician and physician in charge of the Cardiac Department, Cardiff Royal Infirmary. Associated with them are 40 contributors from Great Britain and the Commonwealth, each an expert in his chosen field. The work, however, does not lose its character in the multiplicity of its contributors; the general plan is faithfully followed.

The first volume comprises 34 sections. It may be regarded in part as a series of essays. Titles include: "The Evolution of Modern Medicine" by John D. Spillane, "The Assessment and Promotion of Physical Health" and "The Natural History of Disease" by the late J. A. Ryle, "The Patient as a Person" by J. D. Sutherland, and "Rehabilitation" by T. F. Main. In addition there are discussions on the principles of diagnosis in adults and in children and a critical analysis of the place of the laboratory and of radiology in diagnosis. The remainder of the first volume is devoted to sections on psychiatry, endocrine and metabolic disorders, skin diseases, industrial diseases and tropical diseases, and it concludes with a section on aviation medicine.

The second volume of eight sections includes the more conventional material: diseases of the digestive, nervous, locomotor, cardio-vascular, respiratory, hæmopoietic and urinary systems. There are just over 1000 pages per volume.

The index at the end of the second volume is comprehensive. A full table of contents, with authors, is given at the beginning of the first volume. The table at the beginning of the second volume refers to this volume only. The pages are numbered serially through both volumes. References are listed at the end of each section. Illustrations, some in colour, are used liberally and are numbered on a decimal system for easy reference. The standard of reproduction of X-ray plates is particularly good and details of bone abnormalities can be readily seen. Tables are used with advantage in certain sections—for example, to illustrate the differential diagnosis of blood diseases.

It would be impossible to produce a work of this kind which would be completely up-to-date and with which everyone would agree in all respects. The section on disease of the locomotor system appears rather brief and the views on cortisone are not those now held. The views expressed by one of the editors on physiotherapy appear to be unduly prejudiced against its use and at variance with those of the writer of the section on locomotor diseases. The dosage schedules for streptomycin in pulmonary tuberculosis have been superseded by a more intermittent method. These, however, are minor criticisms and illustrate the difficulties besetting all compilers of medical text-books.

In general this is a first-rate contribution to medical literature. It should prove of great value to medical students. The general practitioner will find it a source not only of information but of inspiration. The editors have achieved two things in this work—firstly an up-to-date exposition of the general progress of medical knowledge in our generation, and secondly the presentation of these facts in the perspective of modern medical philosophy.

Direct Analysis: Selected Papers. By John N. Rosen, M.D.; 1953. New York: Grune and Stratton, Incorporated. 9" × 5½", pp. 192. Price: $3.75.

IF Dr. Rosen's claims are valid his book "Direct Analysis" is a milestone in medicine: he states that psychological treatment restored thirty-five out of thirty-seven schizophrenic patients to sanity within a few weeks.

Rosen was first impelled to try the method which he now calls direct analysis on several schizophrenics in danger of dying from exhaustion accompanied by hyperpyrexia (and inanition?). Because they were also restored to sanity, he then treated less seriously ill schizophrenics in a similar way.

Rosen reported the above numerical results in 1952, five years after the schizophrenics became sane; but, at that time, four of the thirty-five had relapsed into insanity. Because of this he introduced the plan of following "direct analysis" with about two years of psychotherapy along lines followed in the psychoanalysis of psychoneurotics. He claims that with prolonged psychotherapy most of his schizophrenic patients attained comparative normality, and continued that way. He states that seven of them became invaluable assistants by taking custody of new patients until they recovered from insanity, and by telling him the meaning of patients' behaviour when he was at a loss to understand it himself.

Rosen reports that during prolonged psychotherapy patients pass through several stages of recovery before finally attaining health, the last being a psychosomatic one during which they often suffer from asthmatic symptoms or other functional disorders.

Rosen subscribes to the view that the schizophrenic's symptoms express a compromise between wanting to live and wanting to die, without the patient's being aware of the conflict in his mind. Rosen thinks that when the schizophrenic was a baby his mother suffered from an aberration of her maternal instincts which interfered with her wish to be a good mother and led her to starve him of love, the inference being that she also failed to provide sufficient or satisfactory milk. Rosen, as it were, becomes a healthy mother who wants her baby to live, to thrive and to grow into a healthy adult. Rosen shows himself to be "a good mother" by personally feeding his patient with milk and by remaining with him for as long as sixteen hours on end. When the patient is aggressive Rosen harmlessly restrains him, thus demonstrating that the patient's fear of being destroyed is now in the past, and that this "good mother" really wants him to become well.

In many respects Rosen's method resembles that adopted in the psychotherapy of a schizophrenic girl by Mrs. M. A. Sechehaye who called it symbolic realization because she fed the girl, alluded to herself as mother, and did other things having symbolic meaning.

Several psychoanalysts, adapting Klein's method with infants, claim satisfactory results with schizophrenics, but put most reliance on psychoanalytical interpretations. On the other hand, Dr. Rosen and Mrs. Sechehaye both express dissatisfaction with the effectiveness of their interpretations when they were made before sanity was attained, a result that could have been due to incorrect or ill-timed interpreting.

Whether this is so or not, confusion would be reduced if Dr. Rosen adopted the name symbolic realization instead of direct analysis in order to distinguish it from the usual psychoanalytical method, reliance on interpretation. Nevertheless, Dr. Rosen's and Mrs. Sechehaye's experiences may lead to modification of psychoanalytical method, particularly as applied to schizophrenics and other psychotics.

Bodily Physiology in Mental and Emotional Disorders. By Mark D. Altschule, M.D.; 1953. New York: Grune and Stratton. 9" × 6", pp. 236. Price: $5.75.

IN "Bodily Physiology in Mental and Emotional Disorders" Professor Mark D. Altschule has summarized and commented on the extensive literature on the biochemistry of the various bodily systems, apart from the brain, in psychoneurotics and psychotics. Only original work which seemed to him to have been performed under satisfactory conditions has been considered in this survey, though Dr. Altschule has not spared criticism of opinions expressed by psychiatrists. Many of the chapters begin with quotations which give the impression that at least some alienists and general physicians of the nineteenth century were wiser in their generation than their successors. Dr. Altschule maintains that the main weakness of psychiatry today is the unscientific basis of classification of mental disorders, lacking the validity which pathology and bacteriology have given to general medicine. Much work on the biochemistry of mental disorders suffers from neglect of normal variations, faulty technique and ignorance of statistical methods. Lack of control studies reduces the value of attempts to associate certain types of personality with special visceral reactions and indeed the latter do not by any means maintain a regular pattern. There is little that can be measured in psychiatry except loss of weight, and many biochemical studies in psychosis showing deviations from the average are regarded by Dr. Altschule as manifestations of dehydration, starvation and intercurrent infections which are consequences of the mental state. Dr. Altschule also complains that psychiatrists (he refers to the United States) are too little versed in psychology, especially in conditioning and learning.

This book is valuable not only as a summary of work done in a special field and for copious references, but also for criticisms of current concepts and methods which psychiatrists will find salutary, even if they disagree on many points.

The Earliest Stages of Delinquency: A Clinical Study from the Child Guidance Clinic. By H. Edelston, M.B., D.P.M.; 1952. Edinburgh and London: E. and S. Livingstone, Limited. 7½" × 5", pp. 208. Price: 10s. 6d.

THIS clinical study is an endeavour to introduce the "psychiatric" approach to the problem of delinquency without losing sight of traditional moral standards. After a survey of the field and an excellent description of the technique of clinical examination, the author reviews a large series of cases. He considers the majority of early delinquents as being merely maladjusted; many of these can be treated in the home, but a large number need removal from the home and placement in a suitable environment. The remainder need more specifically psychotherapeutic treatment and include those cases which are neurotically determined to those cases which at present are a complete enigma to all, in which "the character structure leaves no scope for neurosis formation in that there is no effective conscience to conflict with their desires". It is refreshing to note that the author in his classification includes the "benign" delinquencies—antisocial mischief due to high spirits—a diagnosis

which indicates his commonsense down-to-earth approach to the problem. For the older and more difficult delinquent, his approach especially is realistic—"Short sentences of imprisonment constitute in general a real social danger and lead to more profound delinquency."

The final chapter deals with suggested prevention and remedies of juvenile delinquency and emphasizes that residential schools on a voluntary basis are essential if those patients not suitable for home treatment are to be adequately dealt with. The whole book emphasizes the necessity in most of these cases to deal with the menace of the parent and the home and to remove the delinquent from it.

Your Brain and its Story. By R. J. A. Berry, M.D., F.R.C.S., F.R.S.E.; 1939. London: Oxford University Press. 7¾" × 5", pp. 184, with 36 illustrations. Price: 8s. 6d.

PROFESSOR R. J. A. BERRY'S BOOK on the structure and function of the central nervous system for the non-medical inquirer had the misfortune to be published in 1939, but the perturbations of the world then and now should not diminish its interest. It is frankly the exposition of a neurological anatomist seeking to simplify a highly technical subject and faces the usual difficulties of background and vocabulary inherent in such a book. Perhaps the anatomical reader may feel at times that the welding of structure and function in the explanation of abnormalities in intelligence and social conduct is not always convincing, but its plain materialism should correct the looser type of thinking on sociology and psychology.

Some of the chapter headings are provocative, such as "Dawn of the Nervous System", "The Twin Nervous Systems of Man", "Service by the Senses", "The Cerebral Cortex as the Lord of Language" and "Fools, Follies and Dreams", but under these captions imagination is not the goal, but insight based on a study of structure. We need not examine terminology too closely, though "Phrenology up to Date" is hardly an accurate title for the chapter it heads. Those who are interested in acquiring or sharpening an acquaintance with man's most signal and intricate physical equipment in relation to his environment could read this book with profit, and the already well-informed reader can also learn from it.

An Atlas of Skull Roentgenograms. By Bernard S. Epstein, M.D., and Leo M. Davidoff, M.D.; 1953. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 10½" × 7", pp. 416, with 603 illustrations. Price: £8 1s. 3d.

THE authors have devoted their efforts particularly to the normal, before turning to the abnormal appearances, as they point out that an appreciation of the normal is essential before passing to a study of the various pathological lesions met with in practice. It is surprising that so much material could be covered by these two specialists. The illustrations are wonderfully reproduced and no retouching has been resorted to in the reproduction. The work is divided into concise departments and, following the admirable descriptions of the normal, various anomalies are shown with plates of the appearances following trauma.

An interesting chapter deals with the various infections. Brain tumours in general are shown, followed by films of the appearances in glioma, primary sarcoma and lipoma. The work also deals with craniopharyngeomata and pituitary adenomata. Metastatic tumours of the vault and changes in Hodgkin's disease and multiple myeloma are beautifully illustrated. Excellent films of non-neoplastic conditions such as Paget's disease, Hand-Schüller-Christian disease and the various anæmias are also well displayed.

Hours could be spent digesting the illustrations in this volume with benefit to the most advanced radiologist, and it should be of the greatest value to men who have not access to a special brain clinic. The work does not deal with the technique of examination, which is already well covered by other writers.

Experimental Studies in Psychiatric Art. By E. Cunningham Dax, B.Sc., M.B., B.S., D.P.M., with a foreword by Steuart Wilson; 1953. London: Faber and Faber, Limited. 9" × 6", pp. 100, with 51 illustrations. Price: 18s.

IN "Experimental Studies in Psychiatric Art" Dr. Cunningham Dax has given an account of original drawings and paintings done by patients under standard working conditions under the supervision of an art teacher who assisted with advice on matters of technique but left the patient entirely free to express himself in artistic productions. Not only were these activities made available to patients for their hobby value, but the results were studied by the medical staff for purposes of diagnosis, for the interpretation of symptoms and as an index of the patients' progress. As might be expected, schizophrenics provided the most interesting material. Those of us who have felt puzzled at what we see displayed in exhibitions of so-called art will be interested to read that there is some resemblance between modern abstract art and schizophrenic magic thinking. A chapter is devoted to the symbolism of the eye and to hallucinations produced by mescalin. Comparison of paintings done before and after leucotomy gives results varying between impaired ability to plan and to appreciate perspective on the one hand, and improvement in conception and performance on the other. Dr. Dax has also observed the effect of listening to selected gramophone records on artistic productions (synæsthesia). If a passage from Mahler's Fifth Symphony proved disturbing, what would have been the response to Scriabin's "Poem of Ecstasy"?

This is an interesting work; it should appeal to artists as well as to psychiatrists, who will welcome this novel objective study of symptoms. There are over fifty illustrations, one in colour.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Endocrinology in Clinical Practice", edited by Gilbert S. Gordan, M.D., Ph.D., and H. Lisser, M.D.; 1953. Chicago: The Year Book Publishers, Incorporated. 9" × 6¼", pp. 416, with 90 illustrations, three in colour. Price: $10.50.

Aims to present to the practising doctor a digest of the material needed for the diagnosis and treatment of endocrine disorders and for the use of hormones in diseases which are not primarily endocrine in origin.

"William Cheselden, 1688-1752", by Zachary Cope, K.B., M.D., M.S., F.R.C.S.; 1953. Edinburgh and London: E. and S. Livingstone, Limited. 9" × 6½", pp. 120, with 24 illustrations. Price: 20s.

The story of "a great surgeon who played a decisive part in bringing about the separation of the surgeons from the barbers and in emphasizing the need for the better scientific education of the medical student".

"Adrenal Cortex: Transactions of the Fourth Conference, November 12, 13 and 14, 1952, New York, N.Y.", edited by Elaine P. Ralli, M.D.; 1953. New York: Josiah Macy Junior Foundation. 9½" × 6½", pp. 166, with 22 illustrations. Price: $4.00.

Four subjects were discussed at the conference.

"Basic Problems in Psychiatry", edited by Joseph Wortis, M.D.; 1953. New York: Grune and Stratton. 8½" × 5", pp. 192, with three text figures. Price: $4.50.

The work of seven contributors.

"Human Neuroanatomy", by Oliver S. Strong and Adolph Elwyn; Third Edition; 1953. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 10½" × 7", pp. 494, with 357 illustrations. Price: £4 0s. 9d.

Planned in order "to obviate the necessity of constantly consulting larger anatomical texts". The first edition was published in 1943.

"Diseases of the Liver, Gallbladder and Bile Ducts", by S. S. Lichtman, M.D., F.A.C.P.; Third Edition; 1953. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. In two volumes. 9½" × 6½", pp. 650, with 233 illustrations, three in colour. Price: £11 16s. 6d.

Covers every aspect of the subject and is well documented.

"Essential Urology", by Fletcher H. Colby, M.D.; Second Edition; 1953. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9" × 6½", pp. 660, with 352 illustrations. Price: 86s.

Not intended as a comprehensive text-book of urology, but to be of use to those preparing for examinations in urology as well as to others.

"The Single Woman", by Margery Fry; 1953. London: Delisle, Limited. 5½" × 4¼", pp. 44. Price: 2s. 6d.

The reproduction of a short broadcast talk.

The Medical Journal of Australia

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All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

TELEVISION.

AUSTRALIA is one of the countries into which television has not yet been introduced. The United States of America and Great Britain have had television long enough for people in Australia to gain from them some idea of what its introduction will mean. Those who have seen television in operation abroad, and others who have read about it know that it is not an unmixed blessing—like many other human inventions, it can be put to proper and improper uses. In order to enable Australians and other peoples who do not possess television to learn something about it and to "watch their step", the United Nations Educational, Scientific and Cultural Organization (UNESCO) has published a brochure entitled "Television and Education in the United States"; the author is Charles A. Siepmann. This brochure is one of a series of studies published by UNESCO and entitled "Press, Film and Radio in the World Today". UNESCO wishes to assist its Member States in the development of television in the interests of education, science and culture. Television can, of course, be used for purposes of entertainment, the dissemination of news and advertisement. For all these purposes television may be both properly and improperly used; members of the British Commonwealth of Nations will recall the feelings of revulsion with which they learned that the Coronation ceremony of Her Majesty Queen Elizabeth II was degraded in some parts of America by the introduction of foolish and irrelevant extraneous matter. We can easily imagine that if the control of this powerful agency was allowed to pass into the hands of unintelligent or money-grubbing individuals, irreparable damage might be done to the nation. There is no reason why this should happen, and it will not happen in this country if those in authority are high-minded and clear-sighted in what they do about it. Many will assert, possibly with a certain amount of justification, that there is a debasing side to radio. By and large, however, we shall all agree that radio has been of untold value in many directions, and especially from educational, scientific and cultural points of view. To take one example only, it will not be denied that the radio has been largely responsible for the increased appreciation of music shown by Australian people; this increase will continue and it will not be possible to assess its value in national affairs.

Siepmann reminds us that television for the public is only sixteen years old. In 1950, television activities, other than those on the experimental side, had achieved importance for the general public only in France, in Great Britain, in the United States and in the U.S.S.R. In 1952, it was a practical reality in seventeen countries. The United States heads the list in the number of television transmitters and receivers, but even there, its introduction was subjected to control. Apparently there was a "freeze" on the setting up of new stations. In April, 1952, the "freeze" was lifted and a new surge forward in the setting up of new stations occurred. In 1952, there were 109 television stations on the air, and seventeen million receivers were in use. In Great Britain, the post-war growth of television has been as remarkable as in the United States—in August, 1952, television transmitters covered about 80% of the population and there were 1,500,000 receivers in use. With other countries we shall not concern ourselves. Siepmann expects that in Australia and New Zealand developments of television will parallel previous developments in broadcasting. He points out that the characteristics both of the system under which television is operated and of the programme services, correspond to the tradition and cultural patterns of the countries in which it exists. He goes on to explain that in the United States, the basic system of operation is commercial. In Great Britain, matters are different, the British Broadcasting Corporation having control. The B.B.C. is a non-profit public service corporation; it is not controlled by the Government. Although this brochure is concerned mainly with television in the United States, reference must be made to a section in which experiments in educational television in the United Kingdom are described. The B.B.C., in May, 1952, undertook a tentative experiment in classroom television. No less a person than the Archbishop of Canterbury described television to schools as nothing less than a perfect disaster. He said that it drove another wedge between the teacher and the pupil and was bad for the children who ought to be looking to the personal contribution of the teacher for their own personal growth. The chairman of the Television Committee of the School Broadcasting Corporation replied to this view, that television would be worth having only if it did two things simultaneously—if it added to the armoury of the good and average teacher, and if it opened for the children new windows on the surrounding world. In an address by a member of the B.B.C.'s television staff, it was stated that television techniques tended to heighten the interest of real life, and that film techniques tended to have the reverse effect. The psychological effect of television was to enhance reality and at the same time to bring about identification between the viewer and what he saw on the screen. The opinions expressed in regard

to television education in the United States tend to support this view. A chapter is devoted to the television system in the United States, and here it is stated that non-commercial channels have been reserved for two communities to be used for educational purposes. In the United States there are 109 stations. Apart from a few key stations owned and operated by the networks, all but one are individually owned commercial stations. The one exception is a station at Ames, Iowa, which is owned and operated by the Iowa State College.

Some interesting views are put forward about the effect produced by television on the habits of the public in relation to other media of mass communication. The conclusions, which, it is stated, should be received with caution, are as follows. In the first place, television's major casualty appears to be radio listening. When a television set is bought, the initial, and to some extent, the continuing effect appears to be a falling off of radio listening amounting to anything from 40% to 50%. Complete agreement has not been reached on the effect of television in regard to attendance at the cinema. However, it is clear that the possession of a television set tends to decrease cinema going, especially at first. In the third place, the newspaper habit appears to be unaffected. Fourthly, the reading of books seems to be seriously affected. A study conducted in the New York metropolitan area reported that 49% of readers of books admitted having discontinued reading entirely after the purchase of a television set; 16% read less than formerly, and only 33% claimed to have been unaffected. In the chapter on educational television at colleges and universities, reference is made to television and medicine. We need not concern ourselves with such events as the telecast of a major surgical operation from the University of Pennsylvania. No adequate reason can be advanced for such a procedure. With the use of television in the medical education of students of medicine all medical practitioners will be concerned. At the University of Kansas the entire surgical curriculum has been revised so that colour television can be used to the best advantage in teaching. Demonstrations are given to groups of some forty students who are required to attend a 90-minute session of colour television teaching each morning for five days a week for eleven weeks. If the sessions are so planned that only procedures essential for students are demonstrated, approval can be given, but there is no doubt that medical students often spend unnecessary hours viewing complicated surgical operations which they are never likely to perform and which merely demonstrate the efficiency and dexterity of their surgeons.

A chapter is devoted to the findings of research, and here a record of fact is given of occurrences at Seattle. Stories have been told from some recent book and the pupils have then been asked to write about the book. The result has been an increase in pupils' desire for reading. It is stated that at the Xavier University no significant difference has been found in school achievement between televiewing children and non-televiewing children. It is admitted that television can be used to excess, and that in this way, physical well-being and mental alertness of children may be damaged. In several other studies, it has also been found that the viewing of television does not, as a rule, seriously affect school achievement. In spite of this, we read that there are a great many teachers who persist in maintaining the opposite view. It is stated categorically that there is, at present, no solid evidence on the psychological influence of television on children. There are two schools of thought. One maintains that human values are distorted, the other that this does not occur. No doubt, the argument will continue until such time as television falls into its proper place in the scheme of things—at least, that is the hope.

In the chapter on his conclusions, Siepmann suggests the condition of further effective advances with caution—great deliberation, more careful and extensive testing and, above all, concern with standards. That this is necessary is clear. It is the serious opinion of the head of a college that there will soon be no need for people to be able to read—that illiteracy will mean the saving of wasteful labour. A plea for caution cannot be made too earnestly, for whether we wish it or not, television will come to Australia. Its value to the community will depend on the way in which it is used and controlled. We are presented with something in the nature of a dilemma. On the one hand, there must be no lowering of the taste of the public, no exploitation by persons or groups of persons, lacking a sense of values, who wish to do nothing but line their own purses. On the other hand, some control is needed. This control should not be a government control, because government controls, in the end, tend to reduce the freedom of the individual. If some non-political statutory body could be appointed which was as free as possible from ministerial control, such a body would be welcomed. If this was not possible, it would be much better to issue television licences to commercial undertakings with insistence on certain specified standards of conduct.

Current Comment.

BRITISH EMPIRE CANCER CAMPAIGN.

THE thirtieth annual report of the British Empire Cancer Campaign covering the year 1952 has recently been published. As is stated in the introduction, "No one who reads this Thirtieth Annual Report can fail to be deeply impressed by the enormous scope of the Campaign's work", for never before has there been such an extensive and detailed organization of effort directed towards one single human malady. Naturally one finds considerable space devoted to clinical findings, pathology, morbid anatomy and treatment of cancer; further, every known device in experimental science which can be applied to the problem is presented with the results obtained. In addition, there are contributions of high value to pure biochemistry, physical chemistry, X-ray technique, instrument design, genetics and the like, which the experts in such subjects will welcome. Possibly some of the researches described may appear at first sight to be rather pedestrian, but he would be a venturesome critic who would deny that a narrow path of investigation might not unexpectedly broaden into a wide avenue of successful inquiry. One of the most important contributions is given by S. H. Revell and concerns chromosome rupture and mending. Hitherto it has been assumed that when broken chromosomes unite the site and orientation of the union are determined by pure propinquity, one might say chance; but in this new view fracture and reunion are regarded as simultaneous, and the many possibilities of chiasmata are presented in

full detail. The suggestion that there may be a correlation between the artificial production of mutations and the aberrant conduct of the living tissue of cancer is extraordinarily stimulating.

That many of the biological effects of radiation proceed from the decomposition of water is now well established, and a quantitative estimation has been made of the disintegration of water by ultra-violet light and γ radiation. An unexpected discovery that may lead to significant developments is that a combined action of progesterone and œstradiol influences the production of cancer in mice. Carcinogens have their potency increased by sex hormones; further, some carcinogens appear to mimic the action of a steroid hormone. As the peak of the cancer induction period is close to the sexual climacteric, this is a very thought-provoking find.

Amongst the more challenging announcements is the conviction of Dr. Geoffrey Keynes that radiation therapy is far superior to radical mastectomy, an operation which he has not performed for twenty-five years. In the late 1930's he replaced radium therapy with X-ray therapy, largely on account of the greater accuracy obtainable. He states that if radical radiotherapy is practical, then shelling out the axillary glands by surgery is to be denounced as leading to œdema of the arm and decrease in mobility of the shoulder joint. This contention is supported by statistical evidence.

These are a few of the more arresting announcements, but indeed each chapter is worthy of careful study, and many facts will be learned which are new to medical science; for example, we are told that a man living in an industrial city is likely to inspire during seventy years of life 100 grammes of carbon in the form of smoke particles, but of this only about 0·25% to 1·0% is retained in the lungs and bronchial glands. Hitherto, the reading of the results of cancer research has not been associated with optimistic hopes; but in this lengthy report a change in outlook is evident, and the reader feels that the hunters of the wild beast of cancer are getting ready for the kill.

GLUCOSTATIC MECHANISM OF REGULATION OF FOOD INTAKE.

THE causation of the feeling of hunger has been discussed for many years and several theories have been put forward, but none has been satisfactory. The view most commonly held was that of Carlson. Cannon and Washburn, as well as Carlson, had shown that epigastric sensations of "hunger pains" coincided with waves of contractions of the empty stomach. Carlson suggested that hyperglycæmia, mediated by its effect on the stomach, might be responsible for inducing hunger sensations. It has been shown repeatedly, however, that total denervation and also surgical removal of the stomach do not fundamentally alter the characteristics of food intake regulation. The fact that destruction of certain areas in the hypothalamus leads to obesity and destruction of other areas to anorexia led to the belief that there is a physiological mechanism in the hypothalamus which controls the intake of food.

Jean Mayer has suggested a glucostatic mechanism and now sums up the evidence for this and the cause of certain apparent paradoxes.[1] The changes in the body content of fat and protein are very small between meals, but the body stores of carbohydrates are limited. The postprandial liver glycogen content in man is approximately 75 grammes—only 300 Calories' worth—and this store, in spite of gluconeogenesis from proteins, is rapidly depleted. It appeared likely that the central nervous system, dependent exclusively on a continued supply of glucose in the blood, should maintain "glucoreceptors" sensitive to fluctuations of available blood glucose. In this "glucostatic" view, hunger would be integrated among the mechanisms through which the central nervous system ensures its homeostasis. To study the mechanism, increases in levels of reducing sugar in blood were obtained by the injection of glucose or fructose or small doses of adrenaline. Decreases were obtained by the injection of small, graded doses of insulin, care being taken not to go below normal physiological levels. It was found that temporary increases in blood glucose levels corresponded to decreases in food intake and vice versa, even when the caloric equivalent of injected metabolites was taken into account. Substances without effect on blood glucose did not influence food intake beyond their caloric value. The variations in food intake were small but significant because of the efficiency of the homeostatic mechanism. Experiments were carried out with alloxan-treated, hypophysectomized rats. Although these animals do not normally show hyperglycæmia, they have been deprived of the mechanisms that ensure the rapid removal of injected glucose; hyperglycæmia can thus be conveniently maintained for a much longer period. Two daily glucose injections were found to reduce food intake by half; three such injections, maintaining hyperglycæmia round the clock, caused death of these animals from inanition in spite of the presence of food in their cage.

The hyperphagia of *diabetes mellitus*, the phenomenon of hunger diabetes and the hyperphagia accompanying tendency to higher glucose levels in the obese have to be fitted into the picture. All these conditions may have one factor in common—namely, that whereas absolute levels of blood glucose are increased, utilization is decreased. Glucose has to pass into cells to be utilized, and this probably implies phosphorylation through the hexokinase reaction. If this is impaired, effective sugar levels will be lowered. To test this concept experiments were performed on human subjects. Blood was taken from the finger, representing arterial blood, and from the antecubital vein, representing venous blood, and the difference in the glucose levels, Δ glucose, represented the glucose utilization. Diets calorically adequate were associated with Δ glucose values which remained large throughout the day, decreasing only at mealtimes. By contrast, submaintenance diets were followed by a rapid shrinkage of Δ glucose values after meals; at the same time hunger returned. In uncontrolled diabetes, a similar picture was obtained, blood sugar values had to be forced up through ingestion of food to levels where arterio-venous differences were introduced for ravenous hunger feelings to be satisfied. Insulin treatment first causes a fall in blood sugar owing to increased peripheral utilization of glucose. In a second phase, a compensatory rise takes place that is secondary to decreased utilization of glucose in the periphery. Delta glucose values rapidly decline when the blood sugar falls to or below post-absorptive levels. The occurrence of increased hunger after insulin administration is therefore easily interpreted.

That "feeding centres" occur in the lateral part of the hypothalamus has been discussed by other workers, and the view is expressed in this paper that these are the glucoreceptors. The postulated hypothalamic impulses are affected by other psychological and physiological factors, so that appetite may be modified at least temporarily. More detailed experimental work on man on the glucostatic mechanism is given in a paper by T. B. van Itallie, R. Beaudoin and J. Mayer.[1] These investigators confirm what has been stated above.

[1] *New England J. Med.*, July 2, 1953.

CLINICO-PATHOLOGY OF OCULAR FOREIGN BODIES.

THE total number of foreign bodies in the eye that have to be dealt with today is much less because of the widespread adoption of safety devices in industry. Nevertheless, the variety of such foreign bodies is probably much greater than ever before. The way in which an eye reacts to individual types of foreign bodies varies, of course, with the nature of the foreign body concerned. An interesting study of these reactions has been made by Bernard A.

[1] *J. Clin. Nutrition*, March-April, 1953.

Roberts and Abraham Schlossman[1] from several thousand eyes collected during the past thirty years at the New York Eye and Ear Infirmary. Their object has been to correlate the pathological with the clinical findings in an effort, where possible, to obtain clues in the treatment of similar cases. The reactions are classified as fair, moderate and mild. Copper is found to set up a severe reaction, resulting in loss of the eye in many cases; iridocyclitis and a strong leucocytic reaction are found in the uveal tract. Stone also sets up a severe reaction, with abscess formation which ultimately destroys the eye; stones containing calcium cause the greatest damage. The right of X-ray radiation to be included as a foreign body is debatable, but Roberts and Schlossman refer to it because of its ability to penetrate the globe. The early reaction to X-ray radiation is severe interstitial keratitis. Later, the cornea may rupture or the characteristic radiation cataract may develop. Lime is another substance which produces a severe corneal burn. It is transformed into calcium hydroxide on contact with water, and this reaction generates heat. In addition, extraction of water from tissues leads to necrosis. This combination produces interstitial keratitis. Of the foreign body substances producing a moderate reaction, wood is mentioned first. It is found that with wood, after several months, a fibroblastic reaction develops, and the foreign body becomes encapsulated in connective tissue. Iron is classified as a moderate irritant, although on occasions the reaction is severe. Within a short time after a piece of iron has penetrated the eye, siderosis is observed clinically by the characteristic brown ring just beyond the contracted pupil. Initial proliferation of the lens epithelium is followed by destruction. Lead initiates a relatively mild reaction, no matter where it comes to rest within the eye. It becomes coated with a layer of insoluble lead carbonate and does not become diffused through the eye. Eyelashes carried into the eye after trauma or surgery may produce a mild response. In the anterior chamber they may become enclosed in cysts.

Referring to the local response at the site of the foreign body, Roberts and Schlossman point out that the cellular reaction varies in different parts of the globe. Regardless of the initial cellular response, fibrous connective tissue and foreign body giant cells of the Langhans type soon invade the area and form the essential elements of the average foreign body bed. One unusual type of reaction, often referred to as a "*Schwiele*" (callus) and consisting essentially of pigment deposition and formation of hyaline tissue, occurs only in the region of the *ora serrata* or that of the optic nerve. In the anterior chamber, the response may be similar to that in any serous cavity, and cholesterin crystals are formed in addition to the usual giant cells and connective tissue. The practical implications of this study are important. It does not need to be said that when there is the remotest possibility of the presence of a foreign body in an eye, X-ray examination should be made of the eye. Because of the severity of the reaction produced, copper, stone and iron should be removed from the eye as soon as possible. Glass, lead and aluminium, on the other hand, cause little reaction, and if removal is difficult, they may be permitted to remain within the eyeball.

OPERATIONS FOR HYDATID CYSTS.

THE use of an eponym for a disease, syndrome or operation is generally undesirable, not only because it is nondescript, but also because the name used often turns out to be the wrong one. N. Barrett[2] in 1949 and N. Barrett and D. Thomas[3] more recently have described the procedure of removing a hydatid cyst intact, and already this has been designated Barrett's operation, although it was performed years ago by various Australian and South American surgeons. Balcombe Quick, of Melbourne, was using it in 1937 or earlier for cysts of the lung. A similar operation for cysts of the liver was described by A. Posadas[1] in 1895; he completed the operation by closing the adventitia without drainage. V. P. Fontana[2] cites V. Armand Ugon, of Uruguay, who in 1947 reported a variation of Posadas's operation (if an eponym may be used just for once). Fontana himself describes a variation of the same operation; it consists of removing the parasite, either intact or after aspiration of the fluid, and then excising the adventitia. In the paper already mentioned, Barrett and Thomas condemn the standard operation of first aspirating the fluid and then removing the collapsed membranes. M. P. Susman,[3] in a paper read before the American Association of Thoracic Surgeons this year, points out that this operation is simple and safe, that it is generally applicable, and that with care there should be no soiling. He roundly disagrees with the statement of Barrett and Thomas that this is a bad operation and should be given up. Susman states that the adventitious space should be obliterated and bronchial fistulas closed by one or more continuous sutures; or, as an alternative, that the adventitia should be excised with the intact parasite still inside it. He points out the risk of rupturing the cyst if an attempt is made to remove it intact after incising the adventitia; the risk of rupture is less if the adventitia is taken with it. This procedure of removing the adventitia must not be used for liver cysts, for, as Susman emphasizes, it may be followed by severe or even fatal hæmorrhage on the table. The various operations for hydatid cysts of the lung may be thus summarized: (*a*) Aspiration of fluid, removal of the collapsed membranes, closure of bronchial fistulas and approximation of the walls of the adventitia by sutures. (*b*) Removal of the cyst intact and treatment of the fistulas and adventitia as previously mentioned. (*c*) Removal of the intact cyst and adventitia together. (*d*) Removal of the cyst either intact or after aspiration of fluid, and then removal of the adventitia. Closed drainage of the pleural cavity is advisable after all of these operations, in order to anticipate complications and to secure prompt reexpansion of the lung.

[1] *Am. J. Ophth.*, June, 1953.
[2] *Lancet*, 2: 234, 1949.
[3] *Brit. J. Surg.*, 40: 222, 1952.

FATAL INFECTION BY CHROMOBACTERIUM VIOLACEUM.

ANTIBIOTIC after antibiotic is being added to our armamentarium, so that we are better equipped to deal with infections than ever before in history. But the enemy, too, can bring up reinforcements, sometimes of a very unexpected nature. Under certain conditions bacteria regarded as harmless saprophytes seem to be able to gather strength, invade the tissues and cause serious or even fatal disease. Sometimes this may occur in patients who are enfeebled by age or disease, sometimes it seems to be due to changes in the normal flora brought about by treatment with antibiotics, particularly the newer broad spectrum antibiotics, and sometimes there is no apparent reason for the sudden acquirement of virulence by a harmless bacterium. *Chromobacterium violaceum* is commonly found in water and in soil and is generally held to be a harmless saprophyte. It is usually grouped with other pigment-producing bacteria, the best known of which is *Chromobacterium prodigiosum*, which produces a brilliant red pigment, but Sneath and his associates state that *C. violaceum* is related to the pseudomonads, whereas *C. prodigiosum* is more akin to the coliform organisms. Three cases of human infection with *C. violaceum* have been recorded since 1938. A few instances of infection with *C. prodigiosum* have also been recorded recently, that is, in the antibiotic era.

P. H. A. Sneath, J. P. F. Whelan, R. Bhagwan Singh and D. Edwards[4] describe an instance of fatal infection with *C. violaceum* occurring in a British Army officer stationed in Malaya. The patient developed an ulcer on the left thigh where some equipment chafed, followed by left inguinal adenitis and fever. He received sulphon-

[1] *Anal. del Circule Medico Argentine*, 18: 13, 1895.
[2] *Arch. Pediat.*, 19: 5, 1948.
[3] *J. Thoracic Surg.*, 26: 112, 1953.
[4] *Lancet*, August 8, 1953.

amides and penicillin without effect and a week later was admitted to hospital. Examination revealed a slightly enlarged and tender liver. The ulcer on the thigh measured one inch in diameter and was almost healed. A provisional diagnosis of amœbic hepatitis was made, and the patient was treated with emetine injections, and with aureomycin and chloroquine by mouth. His condition appeared to improve; after ten days he was afebrile and all treatment was stopped. Four days later there was a recurrence of fever with headache and neck stiffness. The cerebrospinal fluid was normal. His liver became greatly enlarged and tender, and treatment with emetine and chloroquine was resumed. On the twenty-fifth day of his stay in hospital about 40 cubic centimetres of greenish pus were evacuated from the right side of the liver; this contained no amœbæ, but yielded a pure culture of *C. violaceum*. He died on the following day. Autopsy was performed eighteen hours after death, the body having been packed in ice meanwhile. The ulcer on the thigh was almost healed and the inguinal glands appeared normal. The liver contained about a dozen large abscesses containing greenish pus and lined by a pseudomembrane, and also a great many smaller abscesses. There were subpleural abscesses at the bases of the lungs. Pus from these showed many Gram-negative bacilli with a tendency to bipolar or irregular staining. No amœbæ were found. Cultures from six of the liver abscesses and from the pleural exudate yielded pure cultures of *C. violaceum*. These cultures produced a deep violet pigment and were fully identified and compared with several other strains. The patient's strain was virulent for guinea-pigs, rats and mice; other strains isolated from water were virulent for mice, but less so than the human strain.

As to treatment, Sneath and his associates state that energetic treatment with antibiotics is needed when the infection is diagnosed in time. The organism isolated from their patient and other strains examined by them were sensitive to streptomycin, chloramphenicol, aureomycin and terramycin at concentrations easily attainable in the blood; they were resistant to penicillin and to sulphadiazine. In their patient the early response was evidently to aureomycin; unfortunately it was thought to be due to emetine. They comment that this shows the danger of giving more than one drug at a time. They think it likely that *C. violaceum* may be isolated from pus or perhaps from urine and dismissed as a contaminant. If a strain loses its power of producing pigment—and all pigmented organisms, including *Pseudomonas pyocyanea*, do this at times—it may be very difficult to identify. The smell of hydrogen cyanide, produced in culture, may be a clue to its true identity.

NORADRENALINE IN SHOCK.

NORADRENALINE, or norepinephrine, is a naturally occurring hormone produced by the adrenal medulla and also at the adrenergic sympathetic nerve endings. It raises the arterial blood pressure by causing general vasoconstriction and thus increasing peripheral resistance. It has only a minimal stimulant effect on the heart. Adrenaline, within normal ranges, is an all-over vasodilator and causes elevation of blood pressure only by increase of cardiac output. Noradrenaline differs from adrenaline only in the absence of the N-methyl group.

Because of its pharmacological properties, J. H. Moyer, J. M. Skelton and L. C. Mills[1] have studied the effectiveness of noradrenaline in the treatment of various kinds of shock. Studies were also made on twenty-five normal subjects under hospital conditions. After a subcutaneous injection of noradrenaline there was an elevation of systolic, diastolic and mean blood pressures in all cases, together with a decrease in pulse rate. Similar results were obtained by continuous intravenous infusion. There was no significant effect on respiration, vital capacity, circulation time, hæmatocrit or blood glucose concentrations when the injections were subcutaneous, but the blood glucose content rose after intravenous infusion. Noradrenaline was administered intravenously in forty-four cases of shock in which there were no response to treatment with other measures. The concentration was usually 4·0 milligrammes per litre of 5% glucose in water. In a few cases, in order to avoid excessive fluid administration, this was raised to 24 milligrammes per litre. A satisfactory and immediate pressor response with maintenance of the blood pressure at desired levels was obtained in all but two cases. This fact, together with the rapid loss of effect after cessation of injections and the freedom from undesirable side effects, make noradrenaline a valuable adjunct in the treatment of shock. This is particularly the case in patients whose blood volume is normal or increased. Noradrenaline should, however, be looked upon only as a temporary aid in raising the blood pressure and keeping it at normal level, and the underlying cause of the shock must be treated vigorously. It should be used early and not as a last hope.

Fourteen patients with myocardial infarction, all with grave prognosis because of severe shock and other complications, were treated with continuous infusion of noradrenaline. Six of the patients recovered. The drug seems to be particularly useful here because it raises blood pressure by increasing peripheral resistance without concurrent increase in blood volume. Noradrenaline has been useful in the treatment of the hypertensive response of excessively sensitive patients to certain drugs such as hexamethonium, veriloid, aminophylline and mercuhydrin. It has been used with some success in the treatment of severe shock due to operative or post-operative complications and to severe infections, but here it is essential to remove or mitigate the causal condition or the patient will die in spite of the normal blood pressure. Raising the blood pressure from shock level to normal levels increases the work load on the heart, but this is necessary to maintain the cerebral and coronary circulation as well as the circulation to less vulnerable vital organs. In order to save further embarrassment to the heart the blood pressure should not be elevated more than the minimal amount necessary to maintain the circulation of the blood to these vital organs. Because of the potent vasoconstrictive action of this drug cutaneous slough is likely to occur following extravasation of the infusing solution.

[1] *Am. J. Med.*, September, 1953.

SURGERY AND SYSTEMIC LUPUS ERYTHEMATOSUS.

EXTREME CAUTION is widely enjoined in the matter of surgical treatment for patients suffering from systemic *lupus erythematosus*; indeed, the degree of caution in some cases is so extreme as to amount to virtual prohibition. This attitude is challenged by J. M. Greenhouse[1] on grounds that merit consideration. Greenhouse was stimulated to look into the subject when major operations were required by patients with systemic *lupus erythematosus*. The decision to operate was made with some trepidation in three cases of which he supplies details; in no case was there any notable untoward effect so far as the *lupus erythematosus* was concerned. However, before the decision was made, a careful search of hospital records produced 21 cases of *lupus erythematosus* in which operation had been performed since 1947. In several cases multiple operative procedures had been carried out. None of the patients had died, and in no case was the *lupus erythematosus* aggravated; in seven cases the records indicated that the effect on the *lupus erythematosus* was favourable to the patient. These findings suggest that it is possible to be over-cautious when surgical operation is genuinely indicated in cases of systemic *lupus erythematosus*. Greenhouse rightly makes it clear that he does not advocate that operative procedures be performed without thorough study of each individual patient in these circumstances, but he considers that there should be no hesitation in performing surgical operations that may be life-saving for the patient. Elective procedures, on the other hand, should be postponed at least till the disease is in a period of quiescence.

[1] *Arch. Dermat. & Syph.*, May, 1953.

Abstracts from Medical Literature.

PATHOLOGY.

Phase Microscope Studies of Renal Glomeruli.

JACOB CHURG AND EDITH CRISHMAN (*Am. J. Path.*, March-April, 1953) state that phase microscopy lends itself readily to the study of renal glomerular architecture in fixed, paraffin-embedded material. With the aid of mounting media of high refractive index, this technique allows simultaneous visualization of various structures and demonstrates particularly well the fibrillar and membranous constituents, such as reticulum fibres and capillary basement membranes. By combining phase microscopy with various special stains applied to serial sections, fine details of normal histology, as well as location and inner structure of abnormal deposits, can be shown. This procedure was applied to the study of normal glomeruli and of hyaline deposits in amyloidosis, intercapillary glomerulosclerosis, arteriosclerosis and systemic *lupus erythematosus*. The hyaline deposits differ in their inner structure, as well as in their location in relation to the walls of the capillary loops. In systemic *lupus erythematosus* the deposits, so-called wire loops, lie in the capillary wall between the endothelial and the epithelial basement membranes. They are homogeneous and highly refractile. In arteriosclerosis the hyaline deposits first appear under the endothelium and later fill the lumen. They are also homogeneous in structure and only rarely show small vacuoles. Amyloid deposits are found occasionally in the capillary wall, in the same location as wire loops, and more often between the capillaries, presumably in the intercapillary space. These deposits are non-homogenous, spongy or finely vacuolated. In intercapillary glomerulosclerosis, finely vacuolated material appears between the capillary loops. Typical Kimmelstiel-Wilson nodules lie in the centres of glomerular lobules and have a vacuolated or lamellated structure. The distribution of these hyalins and their relation to the capillary wall and to the vascular root of the glomerulus are in accordance with the concept of the intercapillary space, as advocated by Zimmermann, v. Möllendorff, Bensley and McManus.

The Reticular Tissue and the Reticulo-Endothelial System.

A. H. E. MARSHALL (*J. Path & Bact.*, January, 1953) has made a study of the cytology and reactions of the reticular tissue and reticulo-endothelial system in the normal state and in a number of pathological processes, and has arrived at the following conclusions. A widespread system of cells of characteristic morphology and staining reaction with certain metallic salts is present throughout the tissues of the body. These cells have been named "metalophil" cells. The reticulo-endothelial system of Aschoff forms a part of the system of "metalophil" cells, but is not a distinct cytological entity. There is no evidence that the "metalophil" cells are involved in the formation of any other cellular elements, with the possible exception of fibroblasts. The so-called reticulum cells of the spleen, lymph nodes and other areas of the reticular tissue may be divided into two types: (a) "metalophil" cells proper and (b) undifferentiated elements—the primitive reticular cells. Reticular tissue is defined as being composed of fixed cells (primitive reticular cells) supported on a framework of fibrils and including all cells in the body derived from this tissue.

An Unusual Form of Pulmonary Calcification.

MARY E. SHARP AND E. A. DANINO (*J. Path. & Bact.*, April, 1953) report the case of a middle-aged woman with mitral stenosis who suffered from mild recurrent pulmonary symptoms over a period of five years and died at the end of that time in an acute febrile attack of pneumonia. Radiographs of the chest taken during the last five years revealed dense opacity in both lung fields with fine mottling at the apices and in the costo-phrenic angles, which were the only radiolucent areas remaining. Autopsy revealed the presence of myriads of minute, spherical, concentrically calcified bodies, calcospherites or microlithia (the pulmonary *corpora amylacea* of the older German literature), together with osseous nodules of larger size, in a lung affected by non-bacterial pneumonitis. Five similar cases recorded during the last twenty years are summarized. The authors state that these agree essentially with their case in their morbid anatomy and histology and in the chemical composition of the concretions. Only two were definitely cases of rheumatic fever. This type of pulmonary opacity is not necessarily associated with cardiac failure, and iron is present only in small amounts. The condition is to be distinguished clinically from hæmosiderosis and miliary tuberculosis; it may be a sequel to the pneumonitis of acute rheumatism, but the ætiology is not clear.

Acute Arterial Necrosis in the Lungs.

J. DOUGLAS HICKS (*J. Path. & Bact.*, April, 1953) describes a case of mitral stenosis of long standing, with hypertrophied right ventricle. He states that in the lungs, acute necrotic changes are found in the smaller branches of the pulmonary artery, 700μ and under, as well as thrombosis, congestion, membrane formation, bone formation and hæmosiderosis, together with hyperplastic sclerosis and atheroma in the larger branches of the pulmonary artery. Lesions of this type have been recognized for many years, but only recently has their resemblance to *polyarteritis nodosa* been emphasized. The relation of these acute necrotic changes to allergic, rheumatic and hypertensive factors is discussed.

Histological Changes in the Striped Muscles in Myasthenia Gravis.

DOROTHY S. RUSSELL (*J. Path. & Bact.*, April, 1953) describes three types of histological change in the striped muscle fibres in a series of eight cases of *myasthenia gravis*. Type I is an acute change in which fibres undergo necrosis, with resulting inflammatory cellular reaction, and disappear. Type II is a progressive atrophy of individual fibres associated, in the later stages, with the formation of lymphorrhages. Type III is a simple atrophy of different character from that of type II; it affects single fibres or groups of fibres. The incidence and distribution of these types are analysed in the different muscles studied in the eight cases. The results appear similar whether there is a thymic tumour (four cases) or not. It is concluded that the changes are important in relation to the clinical evidence of muscular dysfunction. They are not, however, peculiar to *myasthenia gravis* and are not, therefore, diagnostic of this condition.

Renal Osteodystrophy.

ALBERT E. CLAIREAUX (*J. Path. & Bact.*, April, 1953) describes five cases of renal osteodystrophy and two of nephrocalcinosis. The occurrence of metastatic calcification in cases of chronic renal disease is noted, and a possible mechanism of this phenomenon is suggested. The author states that renal osteodystrophy is a suitable name for this condition, since the pathology of the bone lesions varies, and should be used, as numerous writers have urged, in preference to renal rickets or renal *osteitis fibrosa*. The basic renal lesion associated with deposits of either calcium or cystine in the parenchyma is usually a slowly progressive chronic nephritis. The histological picture is liable to be further complicated by the development of pyelonephritis in the neighbourhood of the deposits. The nature of the bone lesions depends on the extent and duration of the renal disease. Osteoporosis usually develops; more rarely osteosclerosis is seen. In severe renal osteodystrophy there may be lesions similar to those found in *osteitis deformans* and osteopetrosis. A possible explanation of this similarity is advanced. In nephrocalcinosis complicating chronic nephritis the calcium deposits are largely in the renal cortex; in hyperchloræmic renal acidosis the deposits are in the pyramids.

Arteriosclerosis in the Lower Limbs.

ROLAND RODDA (*J. Path. & Bact.*, April, 1953) has examined the arteries in 60 non-ischæmic lower limbs from 50 unselected post-mortem subjects in the later age groups. The examinations were made by intraarterial injection radiography, by dissection, by clearing selected segments and by histological methods. The author states that arteriosclerosis is frequent in both proximal and distal parts of the limbs. Proximally, the intimal lesion is atheronecrotic, with high vascularity, marked elastic atrophy and often calcification. Distally, the intimal lesion is fibrotic, with marked elastic folding; it is, with exceptions, less severe. The degree of intimal thickening is not directly related to age, but it is more often severe in the older age groups, and it is greater in males than in females. Severe intimal thickening appears to be bilateral, but is not symmetrical in distribution. Occlusion of the lumen is found in one or more arteries in 40% of subjects over the age of sixty years. The distribution of occlusion cannot be correlated with the distribution of intimal vascularity and atheronecrosis, which suggests that factors other than intimal hæmorrhage are concerned in causing arterial occlusion in the lower limbs. The quantity of medial collagen is greatest in the proximal parts of the limbs.

Medial calcification is increased with age and is unrelated to intimal disease. Although intimal calcification is common, calcium deposits are more often found in the media than in the intima. A remarkably constant anastomotic pattern of by-pass channels is observed following narrowing or occlusion of the arterial lumen. This pattern, frequently resembling embryological and anatomical variant pathways, develops chiefly in fascial-plane arteries. Muscular and nutrient bone arteries appear to contribute practically nothing to the anastomoses.

Malignant Hypertension.

R. H. HEPINSTALL (*J. Path. & Bact.*, April, 1953) sets out to give an account of the varied pathological conditions encountered at autopsy in a consecutive series of 51 cases of clinical malignant hypertension. No selection of cases is made, except that only those in which the patient had a considerable degree of hypertension and papilloedema in life are included. This is usually associated with terminal renal failure, but in certain cases a cerebral or cardiovascular accident anticipated this event. Twenty-five cases fall into the essential hypertension group; eight are due to chronic pyelonephritis and ten to chronic glomerulonephritis. One is associated with polycystic kidneys, three with toxæmia of pregnancy and four with *polyarteritis nodosa*. No case of essential hypertension is encountered below the age of thirty-five years, the cases in the younger age groups being wholly or secondary hypertension. The blood pressure level is comparable in all groups and is uniformly high, the diastolic pressure being almost invariably over 130 millimetres of mercury. Vascular necrosis is present in both the secondary hypertensive and essential hypertension groups. Certain cases described show vascular necrosis in the absence of impairment of renal function. Thus renal insufficiency is not a necessary factor in the production of these necrotic lesions. The severe degree of hypertension appears to be the cause of the common picture of vascular necrosis in the various groups described, irrespective of the way in which the hypertension is brought about. The fact that a variety of conditions known to cause heightened blood pressure can produce the clinical picture of malignant hypertension with vascular necrosis is evidence in favour of the theory that the difference between the benign and malignant forms of hypertension is one of degree of hypertension attained.

MORPHOLOGY.

Anastomoses between the Carotids.

P. A. JEWELL (*J. Anat.*, April, 1952) made a number of dissections of injected heads of dogs to demonstrate the carotid vascular pattern and particularly the arterial pathways by which the brain may receive a blood supply. Five anastomoses are described: the occipito-vertebral anastomosis, the ascending pharyngeal-internal carotid anastomosis, and the three anastomoses between the internal maxillary artery and intracranial vessels—the anastomotic artery (between the orbital and internal carotid arteries), the ophthalmic anastomosis, and the ethmoidal anastomosis. Of these anastomoses the occipital-vertebral anastomosis and the anastomotic artery are considered to be important routes by which carotid blood might reach the brain. In particular the role of the anastomotic artery is discussed; it is a contributory vessel to the internal carotid flow. The various forms which this artery may assume are described. A consideration of the carotid distribution from the point of view of the anastomoses between extracranial and intracranial arteries has a systematic as well as a functional justification. Within different families of the order Carnivora the carotid circulation shows divergent forms of specialization, such that either the internal or external carotid arteries may become the main source of supply to the brain. In the cat the internal carotid artery has become completely vestigial and carries no blood, the ascending pharyngeal and internal maxillary arteries acting as alternative contributors to the circle of Willis. The opposite extreme is represented in the bears, in which there are no interconnexions of importance between the intracranial and extracranial vesels. The dog occupies an intermediate position.

Fat Content of Striated Muscle in Later Life.

B. E. INGELMARK AND E. HELANDER (*Acta Anat.*, Vol. 14, 1952) state that the ætiological problem of increasing fat content in later life is still unsolved. The fundamental factors are those which seem to dominate the aging process—for example, the decreasing general and hormonal activity, especially of the gonads. In a preliminary survey of these questions the authors carried out certain animal experiments; but no definite conclusions could be drawn. Also it could not be stated whether the same factors govern the deposition of fat in age, in inactivity and after castration. It seems, however, that this increase of fat is a secondary process to the changes in the muscle proteins.

The Vascular Basis of Human Penile Erection.

G. CONTI (*Acta Anat.*, Vol. 14, 1952) has studied the different histological structures of the penis of 20 individuals of different ages (arteries, veins, arterio-venous anastomoses, cavernous tissue, albuginea and para-urethral glands). The research deals with the elucidation of the role of the morphological elements mentioned above during erection. Three schemes are constructed for showing the several possibilities of the blood circulation in the flaccid and erect penis.

Rotation at the Ankle Joint.

C. H. BARNETT AND J. R. NAPIER (*J. Anat.*, 1952) measured the trochlear surfaces of 152 cartilage-covered tali. The medial and lateral profiles of the talus show differences in curvature which indicate that the axis of rotation at the ankle joint is a changing one. This axis is inclined downwards and laterally during dorsiflexion, and downwards and medially during plantar flexion. The expected correlation between the appearance of "wedging" of the trochlear surface and the mobility of the fibula—judged by the nature of the superior tibio-fibular joint—has not been confirmed. However, correlation has been demonstrated between the steepness of the dorsiflexion axis and the mobility of the fibula, and between the steepness of the plantar-flexion axis and the degree of "wedging" of the talus. These relationships are discussed in terms of the possible mechanisms involved. It is suggested that mobility of the fibula and "wedging" of the talus are necessary accompaniments of an ankle axis that is inclined during both dorsiflexion and plantar flexion.

Reinnervation of Striated Muscle After Acute Ischæmia.

D. B. ALLBROOK AND J. T. AITKEN (*J. Anat.*, October, 1951) studied the histological changes which took place in a muscle after partial devascularization. They state that if the damage to nerve and muscle is slight, recovery follows without disorganization. When the terminal parts of the motor axons are involved, regeneration results in a number of fine axons growing down the old neurilemmal tubes, and groups of single atypical end-plates are formed. Extensive damage and necrosis are followed by regeneration of both muscle and nerve; details of this process are described by the author. He states that end-plates are not visible until after about twenty-one days, and after twenty-eight days many of them are well organized. The pattern of innervation, however, remains very atypical, and it is not known whether further recovery occurs, owing to the development of fibrous tissue between the muscle fibres.

Blood Vessels of First Part of Duodenum.

P. DUBAS (*Acta Anat.*, Vol. 14, 1952) finds that the arterial blood supply of the anterior wall of the first part (bulb) of the duodenum is better developed than that of its posterior wall, which is poorly vascularized. The author refers to this as the "pauci-vascular zone", and states that this is the region where duodenal ulcer usually occurs.

Determination of Body Measurements, Surface Area and Body Volume by Photography.

B. GEOGHEGAN (*Am. J. Phys. Anthropol., March, 1953*) states that the use of photography in obtaining quantitative data has been only slowly developed. A system has been developed by which a wide range of body measurements may be obtained from photographs of subjects in certain postures. An investigation was carried out to estimate the discrepancies that may arise from inter-observer and intra-observor errors of (i) direct anthropometry, (ii) skin marking, (iii) posing the subjects for photography and (iv) taking the analogous measurements from the photographs. An analysis of 10 measurements along these lines is given. It reveals that, so far as these measurements are concerned, indirect (photogrammetric) anthropometry is a satisfactory means of obtaining the data. Surface area and total and partial body volumes may also be obtained from measurements taken off the photographs. If the body weight is known, the body specific gravity may be calculated by dividing this by the total body volume.

Special Articles for the Clinician.

(CONTRIBUTED BY REQUEST.)

LXXXVIII.

PERIPHERAL VASCULAR DISEASE.

BY common usage the term "peripheral vascular disease" is being applied mainly to the group of diseases which cause gradual or sudden arterial obstruction, but, of course, venous and even lymphatic affections are included within the meaning of the term. The significance of "peripheral" refers not so much to the distance from the heart as to the size of the vessel concerned. Thus typical claudication may occur in the buttock muscles or the sole of the foot, and it is likely that the arterioles involved in both instances are of the same size. In this country the arterial diseases are mainly of the degenerative type, and their incidence is far more common in the lower than in the upper limbs. Primary Raynaud's disease, which is common in the colder climates of Britain, the United States of America, and north Europe, is rarely seen in its pure state in Australia; typical Buerger's disease is also uncommon in this country, though recently some characteristic cases have been met with in New Australian migrants. The majority of the arterial cases encountered are the result of *arteriosclerosis obliterans* with or without complete blockage of a main vessel.

Clinical Features.

Disease of the peripheral circulation must be suspected in the presence of one or more of the following symptoms:

1. Pain, which is induced by exercise and relieved by rest, is influenced by posture, is localized either to one digit or one side, or is paroxysmal.
2. Changes in colour, especially those which are paroxysmal or are influenced by elevation or dependency.
3. Ulceration, gangrene, scleroderma, impaired nail growth, excessive calluses or paronychial infections.
4. Enlargement, smallness or atrophy of extremities.
5. Excessively cold or warm extremities.
6. Absent or otherwise abnormal pulsations.

Pain.

Pain with Death of Tissue.—The pain of ulceration and gangrene may be extremely severe. Partial relief is obtained from dependency and warmth, but elevation and cold increase it. Frequently the patient sleeps for weeks or months with the legs hanging over the side of the bed until sleep becomes almost impossible. Few conditions produce pain which is so demoralizing as this "rest pain". Occasionally severe pain of this sort occurs in the absence of gangrene; it is called "pre-trophic" pain and is attributable to ischæmia. With acute arterial occlusion pain may come on suddenly and within an hour or two reach full and excruciating development; there is frequently associated numbness, coldness and paresis. However, these latter symptoms may precede the onset of severe pain by as long as twelve hours; and if they are unrecognized, this valuable period for treatment will be lost.

Ischæmic Neuritis.—The pain of ischæmic neuritis is severe, diffuse and spasmodically accentuated. In addition to paroxysms there may be a constant dull and diffuse ache, which shifts from one region to another. These areas do not correspond to any particular nerve, and there may be irregular paræsthesiæ and patchy areas of mottling and erythrocyanosis associated with them.

Pain Induced by Temperature Changes.—Pain induced by temperature changes is met with in cases of erythralgia and when Raynaud's phenomena are present. The former is rare and is not found when the skin is kept cool. It is like the pain of a burn—"a severe sunburn"—and is usually referred to the ball of the foot, the tips of the toes or the corresponding parts in the hands. Severe pain with Raynaud's disease is rare; and when much pain is present it is a good rule to suspect that the associated paroxysmal discoloration of the digits is secondary (Raynaud's phenomena) rather than primary (Raynaud's disease).

Pain of Claudication.—The pain of intermittent claudication is probably the most specific symptom in all the array of human disease. It always indicates an inadequate supply of arterial blood to contracting muscles, it is never brought on by standing, reclining or sitting, but only by continuous exercise, and it is relieved promptly by the cessation of exercise without any change in the position of the affected part. The pain is sharp and cramp-like; when it occurs in the upper third of the calf and diffuses upwards to the back of the knee joint it is probably originating in the gastrocnemii; but when it commmences in the region of the *tendo Achillis* and spreads proximally to involve all the calf it is likely that the soleus is primarily affected. Sole claudication is frequently misinterpreted as foot-strain or metatarsalgia, as the pain is usually confined to the foot and may be of a different character—"like walking on cobble-stones". With milder degrees of claudication the patient may "walk through" the pain, that is, continue walking at a slower speed with milder pain. With severer grades there are gradual stiffening and tightening of the muscles which may reach the stage of complete tetanic spasm. An interesting variant is intermittent venous claudication. It occurs as a sequel to a deep venous thrombosis and the pain is of a deep boring bursting type, which is distinguished from arterial claudication by being most quickly relieved by elevation of the limb above heart level.

The pain experienced in vascular disorders has very characteristic features and gives one of the best clues to the extent and degree of the vascular derangement. There is, however, a tendency to attribute to circulatory derangement pain which cannot readily be ascribed to some other cause.

Ulceration and Gangrene: Their Relationship to the Site of Arterial Obstruction.

Disturbances of the circulation are the commonest causes of gangrene of the extremities. The differentiation of such gangrene into "wet" and "dry" serves no useful purpose either as a pointer to the underlying pathology or as an indication for any special line of treatment.

The ulceration and gangrene of chronic occlusive arterial disease primarily affects the digits, and its presence in a digit implies partial or complete thrombosis in a digital artery. This is the most distal type of arterial block and may occur even though all the main vessels are patent and their pulsation is palpable. Persistent coldness with pallor or cyanosis and pain on exercise in a limb implies proximal main-vessel obstruction; in many such cases sufficient blood is getting through via collaterals to nourish the distal limb sufficiently for it to live, even though the pulse wave has been damped out and rendered impalpable.

The anatomical site of such an obstruction is of as much importance as the extent of the actual thrombus. The other main factor is the rate of development of the thrombus. A clot commencing and progressing slowly may cause few symptoms if it involves an area with rich collaterals. Quiet, insidious thrombosis of the aorta is by no means rare; the patient presents with bilateral symmetrical claudication, and on examination no pulses are palpable in either limb. At operation it has been possible to feel the aorta pulsating normally in the upper part of the abdomen, and on being traced distally the pulse wave disappears at a point where a "thrill" may be felt. Such patients are distinguished by the presence of typical claudicant pain in the thighs and buttocks. Similarly the iliac arteries may become quietly occluded with comparatively minor symptoms in the limb, the symptoms being minimal if the lumbar and gluteal anastomosis remains open. On the other hand, a sudden blockage of these great vessels will lead to extensive and disastrous gangrene. What must surely often happen is the sudden and rapid extension of a preexisting intraarterial thrombus; this is particularly liable to occur during a period of sudden lowering of blood pressure. A sudden increase in the degree of claudication or the onset of peripheral gangrene may follow an acute illness or the injudicious use of vasodilator drugs. In both instances there has been a period of hypotension. Should major amputation result, areas of recent as well as old thrombus can often be demonstrated; or if it is of less severity, clinical examination may reveal that one additional proximal pulse has become obliterated. Occlusion of the superficial femoral artery as far distal as the *hiatus tendineus* in the *adductor magnus* rarely causes gangrene unless it occurs as a really acute incident, but the popliteal segment beyond this point has a deservedly sinister reputation.

Either proximal or distal types of obstructions may occur in the pure state for long periods, and confident recognition of them can be made on purely clinical ground, without recourse to instrumental assistance. The distinction is of considerable prognostic significance and will assist greatly in planning a course of treatment in any specific case.

Ulceration with Raynaud's disease is minimal and consists of small necrotic regions on the fleshy distal parts of the fingers. Gangrene is limited to small patches the size of a

pinhead; it does not affect the toes. The usual story is of a painful brownish zone which, as time passes, separates from the underlying tissue and comes away as a scale leaving a small depression. With scleroderma the gangrene is often more massive.

With chronic venous insufficiency the ulceration is typically in the distal half of the leg, never affecting the foot or toes and not involving the upper limb. When varicosities of the great saphenous system are present, the ulcers are on the medial side of the leg surrounded by a zone of stasis pigmentation and eczema. If no superficial varices are present and deep venous incompetence alone is causative, the ulcers are often on the lateral as well as the medial aspect of the leg, and pigmentation is absent. This latter type tends to be particularly intractable and extensive, even encircling the limb; it is met with characteristically after an ilio-femoral thrombosis or "white leg". Mixture of these two types is often encountered, the ulcer commencing as a pure varicose lesion and subsequently becoming complicated by a deep venous thrombosis. This deep phlebitis may supervene spontaneously, or as a spreading infective thrombophlebitis originating in and radiating out from the ulcer itself during a flare-up of acute infection, or as an unforeseen and unwelcome complication of an injection of sclerosant. The damage wrought by deep vein thrombosis with consequent valvular damage is almost certainly the major vascular factor in making these lesions so peculiarly persistent and liable to recurrence.

Should any such ulcer appear very warm or even hot, the possibility of associated arterio-venous fistula is to be considered. The local varicosities tend to be gross and filled with blood approaching arterial in colour; the limb distal to the lesion may be quite cold. By contrast the ischæmic ulcer of advanced arteriosclerosis, which may or may not be associated with senile diabetes, occurs in a thin, rather atrophied limb, is very indolent and often extensively necrotic, and tends to spread with horrifying rapidity should a comparatively virulent organism gain access to it or if other than a bland dressing is used.

Investigations.

For clinical purposes the specific investigations required are minimal, and in general their results simply confirm the deductions made from a careful clinical examination. No elaborate diagnostic machinery is required.

General Nutritional State of the Limb.

The picture of dry scaly skin and cracked or onychogryphotic nails, with muscle wasting and loss of the subcutaneous fat, is strongly suggestive of chronic ischæmia in a limb. Œdema, venous or lymphatic in type, with sodden and exfoliating skin and colour changes of varied hue indicates a considerable degree of venous incompetence.

Surface Temperature Gradient.

The surface temperature is noted by drawing the back of the fingers along the limb, the action starting proximally. Normally with progress of the fingers peripherally there is a steady fall in temperature. Any sudden fall in surface temperature gradient is conclusive evidence of arterial obstruction. If a mark is made at such a point, it serves as a most useful guide to progress and indicates unequivocally the degree of response to treatment. This gradient may, and often does, remain normal, even in the presence of severe arterial disease, but a positive finding is conclusive evidence of arterial occlusion.

Postural Changes and Delayed Venous Filling.

Raising the limb vertically with the patient lying supine leads to pallor of the extremity, best seen on the soles of the feet and palms of the hands. The speed of development of the pallor and its degree roughly parallel the grades of obstruction. Immediate pallor on raising a foot is pathognomonic of complete obstruction of the popliteal or femoral arteries. With arterial narrowing rather than complete obstruction the pallor progresses to a point at which it remains constant. At the same time the veins collapse; but when the arterial inflow is very reduced, it is found that the veins become actual concave grooves through excessive emptying. The limb is then allowed to hang down, relaxed and fully dependent. There is an immediate and transient increase in pallor if arterial obstruction is a factor, and this is succeeded by the erythrocyanotic flush of reactive hyperæmia. The time taken for venous filling to become apparent is also noted; this may range from a normal fifteen or twenty seconds to several minutes in high grades of obstruction. These changes are all manifestations of the same basic pathological process; taken together and, particularly in comparison with the normal limb, they give a valuable clue as to the state of the vascular tree in the limb.

Arteriography.

Arteriography is a comparatively simple investigation and gives a fairly accurate indication of the state of the main limb vessels and of the extent of any intravascular thrombus. As most iodine-containing contrast media are irritant and as most of the vessels concerned are degenerate or diseased, it is not without risk, especially in the upper limb.

Phlebography.

By means of phlebography the patency of the deep venous channels can be demonstrated and the main valves can often be clearly outlined.

Management.

The vascular diseases have received a lot of attention from the manufacturing druggists, and a large and increasing array of proprietary preparations have been developed. Most of the vasodilators are transient and evanescent in action, and none of the now wide range of anticoagulants appears to have any advantage over the physiological one—heparin.

The principles of management are, however, clear. With occlusive arterial disease the limb symptoms are only one indication of the presence of generalized disease, and the Damoclean sword may fall on heart, brain, kidney or bowel at any time, so that treatment is necessarily limited in its objective. Efforts are made to restore to the patient a comfortable limb and a useful range of exercise; the person who has severe claudication at 20 yards is of little use to himself or to the community; but if that range can be increased to 50 yards he again becomes a valuable social and economic unit, who can manage the ordinary domestic chores in comfort and even take some excursions away from the home. If death of tissue occurs, correctly timed adequate amputation can save the patient much fruitless delay and severe demoralizing pain, whereas nibbling operations on a limb already doomed will only hasten the patient's end. The important decision is to recognize which limb is capable of salvaging and which is not.

When acute intravascular thrombosis has occurred, the problem becomes one of striking urgency. Some tragic mishaps may be avoided if it is recognized that intraarterial thrombosis of a main limb vessel may occur and produce only numbness and paresis for as long as twelve hours before severe pain is felt; it is to this initial twelve hours that measures such as embolectomy, sympathectomy or heparin administration are restricted if a good effect is to be obtained. Should the thrombus be intravenous the element of urgency is only slightly less demanding. Quite apart from the catastrophic disaster of massive pulmonary infarction, the legacy of chronically swollen and painful limbs, of ulceration and eczema, and of persistent ill health that follows deep vein thrombosis is an awful one. It has been properly observed that the doctor who attends a patient with a venous thrombosis in the leg following operation or confinement may be presiding at the commencement of a lifelong tragedy. On the other hand, the unhappy sequelæ of such an incident may be minimized by full heparinization, adequate rest and elevation, perhaps sympathetic release and the avoidance of purely "expectant" treatment.

The following observations are offered as a summary of the writer's views on subjects which are, in these days, strongly controversial.

Anticoagulants.

Heparin must surely be one of the most valuable agents acquired in recent times. Being a physiological substance it is non-toxic. It is an antithrombin and an antiprothrombin, and may even be regarded as an antithromboplastin.

When intravascular thrombosis occurs there is local vasoconstriction leading to slowing of the blood-stream with increased "stickiness" and consequent aggregation and increased fragility of the platelets. As a result the local concentration of thromboplastin rises, and conditions are now favourable for the conversion of the hydrosol, fibrinogen, into the hydrogel, fibrin—a reaction which is largely reversible until quite a late stage in its progress. Such blood is in a "sludge" state. Heparin cuts this Gordian knot in a number of places. It has a direct effect on the platelets, undoing their increased "stickiness" and also restoring their fragility to normal. It potentiates the reversal of the fibrinogen-fibrin reaction and may also have a considerable vasodilator effect. In its presence the thromboplastin titre falls, the velocity of blood-flow increases, the propagation of friable red thrombi is cut short, and the situation comes under control.

This response is observable clinically in acute cases in a surprisingly brief time—in a period as short as 10 or fifteen minutes a full effect may be revealed—and it can be of use

in diagnosis. The patient who, a few days after operation, develops a sharp pain in the chest may be suffering from pulmonary infarction or atelectasis. X-ray and other signs are sometimes inconclusive. If a full dose of heparin is given intravenously and is followed by rapid relief of pain and respiratory distress, it is conclusive evidence that a thromboembolic incident has occurred, and further anticoagulant therapy is given.

Such therapy with heparin is safest and best given intravenously. Subcutaneous and intramuscular injections have been tried; but absorption is irregular, and hæmatomata at the injection sites are common and distressing. Depot heparin in a menstruum is likewise unpredictable and uncomfortable.

There are two mechanisms of excretion, a renal threshold and heparinase, an enzyme. After intravenous injection the initial high blood concentration is rapidly cleared down to threshold level, and the remainder is more slowly destroyed by the heparinase. An intravenous dose of 10,000 units suffices for nearly eight hours, and for practical purposes 10,000 units given eight-hourly intravenously to a person of average size will give a full and adequate heparin effect. In severe cases six-hourly administration may be desirable, and in special circumstances even four-hourly. This may be given into the tubing of an intravenous infusion or through a special appliance, such as a Gordh needle, which remains in the vein and into which the dose is injected as required. There has been some evidence that after heparin administration the blood may become hypercoagulable for a brief period, and it is suggested that the dosage should be reduced gradually by giving it twice and then once only in the last two twenty-four hour periods.

With increasing experience the use of capillary clotting time estimations has been largely abandoned. If the estimation is carried out under standard conditions, it is of value; but unless carefully standardized it is subject to a margin of error of such degree as to render the result of little value or perhaps dangerously misleading. This is particularly so when the size of each dose given is determined by the result of clotting-time estimation. The antidote, protamine, should always be available.

In common with many other substances, the use of dicoumarin has been discontinued, and "Tromexan" and phenylindanedione are rarely used.

Release of Vascular Tone.

The temporary or semi-permanent removal of vasoconstrictive tone plays a valuable part in the treatment of the vascular diseases, but like many another useful therapeutic weapon it has acquired some discredit following its use in unsuitable and badly selected cases.

Sympathectomy by operation gives the fullest possible release of vascular tone in the affected limb. With occlusive arterial disease operation is freely offered to patients under sixty years of age. For those between sixty and sixty-five years the general health is carefully scrutinized and the result of temporary sympathetic block by paravertebral injection noted. For those over sixty-five years it is practised only when the patient is in particularly good condition, and this is rarely good enough to warrant an operation which, at this age, gives promise of a somewhat incomplete effect. In these older patients a most valuable measure is the paravertebral injection of a small quantity of 6% carbolic acid in water. This has a specific effect on ganglion cells and, if reasonably accurately placed, will maintain an effect for as long as six months. After an experience of some hundreds of cases the only side-effect noticed has been a transient neuritis in the neighbouring somatic nerves; this always subsides spontaneously and completely. A number of elderly patients have received much comfort and gratifying increase in their range of exercise from such an injection. Sympathectomy, either by operation or by "chemical" methods, is still the most effective single measure available in the treatment of obliterative arterial disease, and it has the great virtue of selectivity—its effect is maximal in and confined to the operated limb, and there is no effect on the blood pressure as a whole. The majority of elderly patients with occlusive arterial disease are moderately hypertensive and, if we may judge by the rapid and considerable deterioration that is often seen in a mildly ischæmic limb following a period of sudden hypotension, this increased head of pressure would seem to be a physical advantage and a helpful factor in maintaining an adequate blood-stream flowing through partly obstructed arteries. Consideration of this sounds a note of warning in the indiscriminate and over-vigorous use of the generalized vasodilators "Priscol", "Etamon", nicotinic acid *et cetera*. These have most variable effects and in large dosage induce periods of profound hypotension, which are surely best avoided. It is clear that in early cases they are worth a trial, combined with other medical measures and the correction of any orthopædic disabilities. But where peripheral ischæmia is established the benefit of full sympathetic release in the affected limb should not be too long delayed. Such ischæmia may also be encountered resulting, apparently reflexly, from major intravenous thrombosis. With iliofemoral thrombosis or "white leg" the element of arterial spasm must be a major one, and sometimes the effect of paravertebral injections of the sympathetic chain is dramatic, and over a period of twenty-four to forty-eight hours pain and œdema may disappear. With lesser venous thromboses, after the tide has been turned with heparin and the thrombus is firmly attached, sympathetic release will often speed up resolution of residual œdema and recovery of function in a most heartening fashion.

Amputation.

The mixture of proximal and distal arterial occlusion with superadded gangrene indicates that a limb is doomed. When no pulses are palpable below the femoral in the groin and there is spreading gangrene of a toe—gangrene of the great toe is of particularly sinister significance—with rest pain, major amputation is indicated. The correct timing of operation is important. If it is performed too early, the patient will often resent it bitterly and feel that with "another chance" the limb might have been saved. If it is left too late, the patient may become demoralized both mentally and physically by the appalling and terribly insistent rest pain of ischæmic gangrene, and within a period of a few days may pass from a moderately good to an extremely bad operative risk. Also the risk of severe "phantom limb" pain is increased if pre-operative pain has been too long endured. The best time for operation is as soon as the patient asks to be rid of the limb, and it is then a matter of semi-urgency. In these litigious days a second consulting opinion is a wise precaution before operation. Thigh amputation is most satisfactory; in the very frail, disarticulation through the knee joint is almost shock-free and often quite successful. Below-knee amputations frequently leave a cool, poorly covered and perhaps discharging and uncomfortable stump, and except in the younger amputees retention of the knee joint is of no advantage. The great majority of these patients can manage no prosthesis at all; a few will try a simple straight pylon.

Conservative surgery is safe when the arterial disease is essentially distal and when the peripheral pulses are present. Particularly is this so when diabetes is aiding the infective element. Local sloughs and small areas of gangrene are best kept wet with saline-eusol; or, more recently, the streptokinase-streptodornase enzymes have been found useful in clearing such areas. This, combined with topical antibiotic therapy and perhaps temporary or permanent sympathetic release, may give a margin of safety and permit quite extensive local surgery to be successfully carried out. But when the peripheral pulses are absent, the scales are weighted against the surgeon, and the adoption of more radical measures becomes a difficult clinical decision, which must be taken with clear vision by both patient and surgeon alike.

Ulceration.

Ulceration is a big problem and is like the poor—but not confined to them. To each leg ulcer there are two primary factors—one vascular and one infective. It is against the latter that the main attack is turned, and with properly applied broad-spectrum antibiotics all these ulcers can be successfully skin grafted, with or without deep scar excision, and covered with well-taken partly stabilized epithelium in four or five weeks. Solutions of aureomycin or terramycin in normal saline in a strength of two to five milligrammes per millilitre are advised and are best applied on gauze under an occlusive seal of "Cellophane" or oiled silk. Grafting may be safely undertaken within a few days of starting treatment. All obvious varicose veins should be carefully sought and dealt with thoroughly. In some, in which there is an element of arterial insufficiency or an extensive deep phlebitis, and a sodden hyperhydrotic lymphœdematous skin, lumbar sympathectomy helps. All these patients will require the support and protection of a light-weight elastic stocking subsequently, and, as the underlying vascular factor remains, every effort should be made to have the grafted area absolutely firm and stabilized before a return to work is made. Permanent success can be achieved only if the patient gives cooperation and thoughtful care of the limb.

Chronic ulceration of the fingers is often associated with Raynaud's phenomena. Clinical, radiological and perhaps surgical exploration of the root of the neck is required; and if surgery is undertaken, dramatic results are sometimes achieved following excision of the upper dorsal sympathetic ganglia.

Conclusion.

In our warm climate the commonly encountered vascular abnormalities are the result of arterial degeneration or venous thrombosis. Much can be done if the nature of the former is clearly visualized, and if the latter, when it occurs, receives early, prompt and vigorous treatment.

JOHN LOEWENTHAL,
Sydney.

British Medical Association News.

SCIENTIFIC.

A MEETING of the South Australian Branch of the British Medical Association was held on June 18, 1953, at the Verco Theatre, Institute of Medical and Veterinary Science, Adelaide, DR. B. S. HANSON, the President, in the chair.

Prostatic Obstruction.

DR. IAN HAMILTON read a paper entitled "The Modern Treatment of Benign Prostatic Obstruction" (see page 780).

DR. I. B. JOSE stressed the value of excretion pyelography in supplementing a full clinical examination in the diagnosis of prostatic enlargement; by it was avoided, in the majority of cases, the use of instrumentation or cystoscopy in assessing the pre-operative condition of the urinary tract, the degree of obstruction, and frequently the type of prostatic enlargement. Dr. Jose said that a very great change had come over the surgery of hypertrophy of the prostate during the last twenty years in regard to the time of operating. Early operation had been made more feasible by the protection of antibiotics in controlling infection before and after operation. Furthermore, the use of a catheter, fixed by the tip or of the indwelling Foley type, caused better dependent drainage of the bladder and so prevented infection of the bladder and ascending lymphatic infection of the kidney.

Dr. Jose stressed the danger of indiscriminate instrumentation in acute retention of urine. He said that the technique he recommended was the insertion of a small, well-oiled Tiemen's catheter, not too stiff or sharply pointed, and yet not too limp; the utmost gentleness was necessary in its insertion. A finger in the rectum often aided its ingress to the prostatic urethra. If this failed, it was justifiable to use a bicoudé gum elastic catheter, again with great gentleness. If it was impossible to get the catheter in, the alternatives were an immediate prostatectomy (which could be carried out only in institutions prepared for such work), or suprapubic puncture performed under local anæsthesia. A small incision was made through the skin and *linea alba*, a trocar and canula about one-quarter of an inch in diameter or less was inserted, and a self-retaining tube was passed through its lumen into the bladder and the canula was withdrawn.

Dr. Jose went on to say that the type of prostatic obstruction which could be treated by transurethral resection had more or less become standardized by most urologists and surgeons. There was variation according to the ability of the resectionist; but on the whole the majority of surgeons now regarded resection as limited to the following conditions: (i) inoperable carcinoma with obstruction, which needed freeing; (ii) the small fibrous type of prostate; (iii) small middle lobes or median bars causing the major obstruction; (iv) median bars with small lateral lobes, when there was not a great deal to be felt *per rectum*, or *per rectum* with a sound in the urethra, especially in early cases of obstruction confirmed by excretion pyelography, cystography or occasionally cystoscopy; (v) post-prostatectomy ledges, which occurred after the Freyer, the Millen or occasionally the Harris type of operation.

Dr. Jose said that in the past five years his own figures had shown that the relative number of resections was two as compared with every three operations by the suprapubic method.

The question as to which was the best type of operation could best be answered by the statement that the present favourite trend among the younger surgeons was use of the retropubic route for suprapubic enucleation; but the mortality and morbidity rates among the more experienced surgeons in their own method, which they had been practising for a long time, and in which they had become proficient and experienced, would not warrant many of them changing over to a new method. Each method produced its complications and difficulties. Time only would tell whether total prostatectomy was a justified standard measure for a routine method in the treatment of apparently simple hypertrophy. In regard to post-operative care, now that infection had been to a very large extent controlled, one of the greatest dangers of prostatectomy was post-operative thrombosis and embolism. This made it necessary always to examine patients for early signs of thrombosis in the legs, especially from the time of getting up out of bed to about the tenth or fourteenth day, and to use heparin and dicoumarol judiciously and to have prothrombin estimations made.

Dr. Jose finally brought to the notice of members three patients with recurrent adenoma of the prostate whom he had treated twelve to twenty years after prostatectomy had been performed by a competent surgeon. In each case the major sign was not obstruction, but recurrent severe hæmaturia in attacks with long intervals between. Cystoscopy and pyelography showed in each case a very great enlargement of the lateral prostatic lobes, and in each case the symptoms were successfully relieved by a second prostatic enucleation.

DR. N. J. BONNIN said that while he agreed with most of what Dr. Hamilton had said, he wished to join issue on a few points. While he favoured the Millin procedure for uncomplicated adenomata, he considered that certain other types of bladder neck obstruction were better treated by different methods. As a basis for what he had to say, he wished to quote some figures of his own for private and hospital patients operated upon within the last four years. There was a total of 272 operations, with three deaths in hospital. Of these cases, 86 were Millin prostatectomies, with one death due to an embolus on the third day. There were 162 endoscopic resections with one death, and 24 other patients treated by a variety of operative procedures with one death among this group. The figures had been taken from case records of private patients, and the hospital figures had been supplied and checked by the records department at the Royal Adelaide Hospital. The large percentage of endoscopic resections was accounted for by the fact that those cases mostly represented patients treated at the Royal Adelaide Hospital and referred by other surgeons who regarded them as unsuitable for "open" surgery, either because of the type of gland causing the obstruction or because of their general condition. Most of them had either small fibrous prostates or carcinomata, and in either of those types of case the operation of endoscopic resection offered the patient relief of his obstruction with far less risk and discomfort than did any open procedure. The instrument itself did not cause incontinence of urine. The external sphincter muscle could always be located; if that muscle was not damaged the patient was continent of urine, and if that muscle was damaged, then the patient would be incontinent. In the series reported there was one case of partial incontinence in which the sphincter was probably injured. In two cases of extensive carcinoma of the prostate, incontinence of urine occurred after operation, but cleared up completely as the gland came under the control of œstrogen; and in those cases, infiltration of the external sphincter by tumour was almost certainly the cause. However, there had been several troublesome strictures; four required continued treatment. Dr. Bonnin said that the strictures had followed his acquisition of a small resectoscope, after which for a time external urethrostomy was not performed. However, no strictures had occurred in patients treated by resection through a perineal urethrostomy, and the complication of stricture seemed to be entirely avoidable.

Dr. Bonnin went on to say that the last group of cases were mainly those in which the bladder had to be opened for one reason or another—for example, for the removal of a diverticulum (13 cases). Some form of modified Freyer procedure or a sphincterotomy was performed in such cases. A common procedure in the United States of America, and quite a good one, was to enucleate the prostate and control bleeding by means of a Foley balloon catheter wrapped in "Oxycel" gauze. In such cases, a small suprapubic tube was employed. Dr. Bonnin said that he considered it important to bring out such a tube through a puncture wound in the bladder and not through the main incision in the bladder. The post-operative convalescence of patients treated by that method compared favourably with that of the Millin group, and if the bladder had to be opened, then to go into the retropubic space and expose the prostatic capsule there and make another incision seemed only to be making an easy procedure difficult. Those 24 patients had all some local complication, and the group constituted an argument for careful pre-operative investigation of patients with bladder-neck obstruction; by the same token, it constituted also a strong argument against emergency opera-

tion on patients with acute retention of urine. Excretion pyelography was used, as had been mentioned by Dr. Jose, in most cases in which acute retention of urine had not occurred. In cases in which catheter drainage had had to be used before operation, a cystographic examination was usually carried out. That was a simple procedure and free of risk, and it gave information about such conditions as the presence of a diverticulum, a carcinoma or a hydronephrosis with reflux up a ureter, as well as showing the size of the intravesical part of the prostate. A cystoscopic examination was usually performed, in addition, at some stage before operation.

Dr. Bonnin said that he considered that the great fall in recent years in mortality after prostatectomy was due to bacteriological rather than to surgical advances. Sensitivity tests against antibiotics were used repeatedly in all cases and had proved most reliable, to judge by the clinical response. In patients who did not respond as expected, there was usually another organism present, not picked up in the culture previously made. He favoured the Millin operation for uncomplicated adenomata, because on the operating table it made possible a visual clearance of seed adenomata which might cause recurrent obstruction—and that, incidentally, occurred with procedures other than resection, as Dr. Jose had pointed out. The short period of catheter drainage and the comfortable and rapid convalescence were perhaps the strongest arguments for that procedure. The mortality, however, was now just as low with other types of operation, provided the same careful bacteriological studies were carried out. Dr. Bonnin considered that the main factor in obtaining a low mortality was careful pre-operative investigation of the local condition as well as of the patient's general state of health, together with full use of laboratory facilities in applying antibiotics for the control of infection. Improved anæsthesia and the ready availability of blood and fluids for intravenous administration, when needed, were also major factors in producing a fall in mortality.

DR. A. C. MCEACHERN expressed general agreement with Dr. Hamilton's views. Referring to the management of acute retention of urine and the importance of aseptic catheterization, he said that it was unfortunately true that in the passage of a rubber catheter gross breaches in asepsis were extremely common. For example, it was quite impossible to pass aseptically a rubber catheter which had been boiled curled up in a small receptacle. A careful technique was especially necessary in the first catheterization, and this need was at its greatest in the highly infective environment of an over-crowded surgical ward. For that reason it was the practice in Dr. McEachern's unit at the Royal Adelaide Hospital for the first catheterization to be carried out in the operating theatre by the surgical registrar, and the incidence of accidental infection of the bladder had been lessened thereby. Prostatectomy was delayed for twenty-four to forty-eight hours for reasons of convenience, and to allow time for adequate physical examination and assessment. Important associated disease was not uncommon in that class of patients, and if they were subjected to immediate operation as a routine procedure, serious errors in diagnosis and management would inevitably occur.

DR. S. KRANTZ said that he did not think it would be wise to allow the general practitioners present to go home with the idea that the operation of prostatectomy was as simple and as free from complications as Dr. Hamilton and Dr. Bonnin might have led the meeting to believe. Certainly those two speakers had presented a large number of cases with a surprisingly low mortality rate. However, Dr. Krantz believed that if the cases of all the surgeons at the Royal Adelaide Hospital were examined, then the mortality rate and the incidence of complications would be much higher. Dr. Krantz believed that more nursing hours were spent on prostate patients in the post-operative wards than on any others, and that the sister in charge would support him in that statement.

Dr. Hamilton, in reply, said that he agreed completely with Dr. Jose's condemnation of indiscriminate instrumentation prior to prostatectomy, mainly on account of the risk of introducing infection, and also because other methods were available for investigation. He had used excretion cystograms and found them valuable. He agreed with Dr. Jose that certain patients were probably best treated by resection; but the choice depended upon the skill, training and inclination of the surgeon. In reply to Dr. McEachern, Dr. Hamilton said that he had not had his patients sent to the operating theatre for catheterization, but he agreed that certainly every possible effort should be made to have ideal conditions for the catheterization in order to avoid infecting the urethra and bladder. In reply to Dr. Bonnin, Dr. Hamilton said that while he did not question Dr. Bonnin's faith in presenting his statistics of 272 operations for prostatic obstructions with only three deaths, he believed that if this was so the surgical millennium had arrived for those patients; it would be expected that if 272 healthy men of an average age of seventy years were put to bed in hospital for a fortnight, probably that number would die from this alone. With regard to Dr. Bonnin's statement about the value of endoscopic resection, Dr. Hamilton said that he felt that it was not the instrument which was at fault so much as the brain behind the use of the instrument; few had the patience, the time or the capacity to get really satisfactory results with the resectoscope. Dr. Hamilton agreed that sometimes the bladder had to be opened, but said that he had not tried the method of using a stab wound in the bladder to lead out the suprapubic tube. He had no doubt that such a wound would heal rapidly and could therefore be conducive to a short and easy convalescent period.

In reply to Dr. Hanson's question about *osteitis pubis*, Dr. Hamilton said that that complication was said to be characteristic of retropubic prostatectomy. However, he had not seen it, and he thought that there must be some mystery about the cause of it—something in the technique not yet understood. He had no fear of it himself. In reply to Dr. Krantz, Dr. Hamilton said that he agreed very heartily that the sister in charge of the recovery ward was a good witness to the troubles in the after-treatment of prostatectomy patients. He thought that many of the surgeons and not only the juniors would learn a lot about their operative inefficiencies if they had an occasional humble talk with the sister in question.

A meeting of the New South Wales Branch of the British Medical Association was held on September 24, 1953, at the Robert H. Todd Assembly Hall, British Medical Association House, 135 Macquarie Street, Sydney, DR. A. J. MURRAY, the President, in the chair.

Anæsthesia in Abdominal Surgery.

DR. J. F. MCCULLOCH read a paper entitled "Some Aspects of Anæsthesia in Abdominal Surgery" (see page 786).

DR. V. M. COPPLESON read a paper entitled "Anæsthesia in Abdominal Surgery" (see page 787).

DR. S. V. MARSHALL, in opening the discussion, thanked the speakers for their papers and remarked on various undesirable features exhibited in their subject matter. He took exception to Dr. McCulloch's predilection for so-called minimal anæsthesia, and made a plea for the properly balanced use of the various excellent agents now at the anæsthetist's disposal. He said that it was absurd to run the risk of a patient's waking in the course of an operation, even if he apparently did not suffer pain or mental distress; and however spectacular the recovery of consciousness immediately following an operation, it was cruel and distressing to send the patient back to his bed in severe pain. Decent oblivion, properly regulated, of course, was a far preferable and quite reasonable aim. Dr. Marshall felt that, after listening to Dr. Coppleson's remarks, those present must realize what difficulties confronted the anæsthetist in pleasing the surgeon. Prejudice and distortion of facts made a common appreciation of the requirements in any particular case almost impossible. It was nonsense to condemn the various gaseous agents, and to accord faint praise to the relaxants indicated a poor appreciation of the fact that they had virtually revolutionized surgery. It was astonishing that Dr. Coppleson should urge the desirability of anæsthesia controlled by electronic methods. Some three years previously Dr. Marshall had protested in the daily Press against an announcement, emanating from the Mayo Clinic, recommending "brain wave" anæsthesia. Surely the hands, eyes and mind of a well-trained anæsthetist were preferable to scientific curiosities. If robot anæsthesia was practicable, so too must be robot surgery. In neither case, however, could human judgement and skill be dispensed with.

DR. J. R. RADCLIFF said that he did not agree with Dr. Coppleson's statement. He thought that relaxants could be used when the patient was in the Trendelenburg position, provided that the arm was not abducted.

DR. KATHLEEN CUNINGHAM said that she was fortunate in working with an expert team of anæsthetists who had tried everything on her except hypotensive methods. She had been in London in 1950 and had heard Gillies deliver his lecture on hypotension in anæsthesia, and had been rather horrified. Dr. McCulloch had referred to the patient who

had awakened during anæsthesia; she herself had had that experience twice. One of the patients was a girl who was undergoing the operative removal of a sebaceous cyst from her cheek. She was given two cubic centimetres of "Pentothal", and went into the worst laryngeal spasm that she (Dr. Cuningham) had ever seen; the patient appeared as if she had suffocated. The anæsthetist with great presence of mind gave her a relaxant; then three or four minutes elapsed before she could be intubated and anæsthetized with cyclopropane. The patient said afterwards that for three or four minutes she thought that she was dying; she could not breathe. The other case had occurred before relaxants came into use. The patient was to undergo hysterectomy, and the family practitioner insisted on ether. After twenty minutes' administration of ether the patient was still unanæsthetized, and a Clover's inhaler was brought out; the patient finally lost consciousness when the Clover's inhaler was used, and the anæsthesia was maintained without it. While the second uterine artery was being tied, the patient suddenly said: "I hope it is not going to be hot down here when I am convalescing in bed."

DR. MARIE HILL said that she had one or two questions to ask. Dr. Coppleson had said that he liked his patients to be snoring before they were given spinal anæsthesia, and also to have pethidine. Dr. Hill wondered whether a small dose of "Pentothal" would not be equally effective. Dr. Hill did not agree with Dr. Coppleson in his lumping nitrous oxide and cyclopropane together as useless gases. Dr. McCulloch had referred to ether anæsthesia for patients suffering from bronchial spasm. Dr. Hill wondered whether Dr. McCulloch meant the ether to be given during bronchial spasm, or whether he was referring to the next occasion on which the patient had to be anæsthetized.

Dr. McCulloch, in reply, said that he did not want those present to think that all his anæsthetic patients "skidded along" on the verge of consciousness; but he did not agree that it was a bad thing for the patient to yell on the way back to bed—at least it showed that the patient was alive and that the reflexes were active. Referring to the question of bronchospasm, Dr. McCulloch said that he had not meant to imply that the relaxants caused bronchospasm; he meant to say that it was produced by manœuvres such as the insertion of tubes. One patient had had to be anæsthetized at Sydney Hospital on three occasions, and every time had such a violent spasm that all respiratory activity ceased for a very long time; the only way to control the condition was by inflating his lungs with oxygen and ether. Referring to anæsthesia for chronic bronchitis, Dr. McCulloch said that a small dose of "Pentothal" and ether was better than other anæsthetic agents.

Dr. Coppleson, in reply, said that Dr. Radcliff had rather misunderstood the question of the Trendelenburg position. He (Dr. Coppleson) did not wish to imply that it should never be used, but that it should be used with great care. He did not doubt that surgeons and anæsthetists constantly working on the same types of cases could develop safe techniques. Dr. Shea should have answered the question on pethidine used on the patient shown in the chart as it had been his idea to give it. Dr. Coppleson said that his statements concerning gaseous anæsthetics had referred to abdominal surgery. Those types of anæsthesia might be quite suitable for other types of surgery, but they were not generally satisfactory for abdominal surgery. He could remember the time about twenty years earlier when any patient needing an operation who looked likely to die was invariably given nitrous oxide; it often proved a passport to heaven. Dr. Coppleson then referred to what Dr. Marshall had said about hypotensive anæsthesia, and pointed out that Dr. Marshall had been the first to give it in a case of his (Dr. Coppleson's). It was an operation for radical amputation of the breast. Dr. Coppleson said that he was fascinated by automatic anæsthesia, and believed it could play the part in anæsthesia that the automatic pilot played in aviation. The principle was quite simple. The machine had a small revolving drum, on the top half of which the electrocardiogram was recorded, and on the bottom half the electroencephalogram. The waves of the electroencephalogram were deep when the patient was lightly anæsthetized, and when the waves were small and shallow the patient was deeply anæsthetized. With this as a basis, when anæsthesia became lighter, a suitable amount of the anæsthetic agent was automatically delivered. Dr. Coppleson believed that automatic anæsthesia would form the basis of even better anæsthesia than was possible at present. In Sydney they were fortunate in having a body of well-trained and expert anæsthetists.

Dr. Murray, from the chair, thanked both the speakers for their papers, which had been based on wide experience and were very practical. Dr. Coppleson had recognized that anæsthetists had worries. Dr. Radcliff had been too polite to say that one of the anæsthetist's worries was the surgeon. However, both realized that the patient was the main concern, and if they got in each other's way it was only because of that. Dr. Murray believed that a meeting such as that evening's would tend to put both surgeon and anæsthetist on the same wave-length, as Dr. McCulloch had said. Anything that tended to do that was in the patient's interest.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

FROM DR. REDFERN'S REPORT ON CONDITIONS EXISTING ON CONVICT SHIPS.[1]

September 30, 1814.

It becomes necessary to make a few observations respecting the Medical men who are appointed to take care of the health of the Convicts on their passage. Those who have been hitherto appointed have been either Students from the lecture room or men who had failed in the respective lines of their profession. If from the first class they are without experience, and however they may be fraught with the instructions conveyed in the various lectures they have Attended, or with the Contents of the Numerous Volumes they have read, they are but ill-qualified to take charge of the health of two or three hundred men about to undertake a long voyage through various climates and under particularly distressing circumstances without a sense of conscious rectitude to support them, dissatisfied with the past, repining at the present, and apprehensive of the future, deprived of the power of enjoying the Air and exercise etc. necessary to Maintain the due equilibrium of temper and Spirits so essential to the well being of man. If from the second, it but too frequently happens that either from the cause or the consequence of their failure they totally devote themselves to inebriety.

How little capable either the one or the other is for this important trust is too self-evident to require demonstration.

Besides, they are employed by the owners of the ships and placed immediately under the Command of the Masters of the Transports who with few exceptions having little claim to education, refined feeling, or even common decency, generally treat their surgeons as they do their Apprentices and Men with rudeness and brutality.

Incapable of appreciating the value of learning and despising all knowledge beyond what they themselves possess, they avail themselves of every opportunity to insult and Mortify their Surgeons. Under this species of treatment, with no means of redress during a long voyage, the Mind becomes paralysed, they view their situation with disgust, And, if they have the means, should they not have been so before, they soon become confirmed drunkards. Hence their duty is neglected, and the poor convicts become the unhappy Victims of the Captain's brutality and the Surgeon's weakness, want of Skill or drunkenness.

That this picture is not surcharged the records of the Colony will furnish but too many proofs. Yet, at the same time, it is but fair and just to observe that, altho this is by much too frequent, it is not so General but that there is now and then an exception.

With a view therefore of providing Skilful and Approved Medical Men for this Service, it might not perhaps be deemed improper to suggest that the Surgeons ought to be appointed by Government selected from Surgeons in the Navy—Men of Abilities who have been Accustomed to Sea practice who know what is due to themselves as Men and as Officers with full power to exercise their Judgment without being liable to the Control of the Masters of the Transports.

[1] From the original in the Mitchell Library, Sydney.

Correspondence.

CÆSAREAN SECTION ON A LIONESS.

SIR: The recent much-publicized case of a Cæsarean section performed by two gynæcologists upon a lioness at the zoo has opened up several interesting problems, of which one

is concerned with the perhaps sordid but necessary question of fees.

Now that the precedent has been established of "women specialists" acting on occasion as "animal specialists", it would appear desirable that, in the schedule of fees approved under the Commonwealth Medical Benefits Scheme, some distinction should be made as to whether the services refer to those given to humans or to animals. I suggest that wherever the words "Cæsarean section", "confinement", "hysterectomy" *et cetera* occur, there should be added the word "human" or "feline" as the case may be. In any case, surely an operation upon a lioness should be worth some "danger money".

Yours, etc.,
"B.W.O."

Hornsby,
New South Wales,
October 26, 1953.

RECENT EXPERIENCES OF THORACIC SURGERY IN NEW SOUTH WALES.

SIR: Lest the impression be created that thoracic surgery in Australia is in the stagnant state suggested by Mr. Ian Monk's article in the journal of October 17, I would like to make the following comments.

At the Alfred Hospital, Melbourne, we have 20 thoracic surgical beds, and we operate on over 300 patients each year for non-tuberculous chest conditions. This work occupies a total of five half-day operating sessions each week, and at four of these sessions Mr. K. N. Morris and I are working together in one theatre with one anæsthetist. With a second theatre and another anæsthetist, and more assistants, by working separately, we could do another 200 operations per year in the same time. Patients with non-tuberculous conditions wait for four to six months for admission.

In addition we each operate on one half-day a week at the Austin Hospital, where we do between us approximately 100 operations for pulmonary tuberculosis every year.

I would suggest that there is a large volume of chest surgery for non-tuberculous conditions waiting to be done in New South Wales. This work is an important and often spectacular section of the work of first class hospitals throughout the world. Adequately trained thoracic surgeons are still rare in Australia, and if the hospital where Mr. Monk works cannot provide him with 15 or 20 beds for non-tuberculous patients, it does not deserve the services of a first class thoracic surgeon.

Yours, etc.,
C. J. OFFICER BROWN.

12 Collins Street,
Melbourne,
October 23, 1953.

A REPORT ON AN INVESTIGATION OF A COUNTRY MIDWIFERY PRACTICE, WITH THE PRELIMINARY RESULTS OF 300 CASES FOLLOWING IMPROVED OBSTETRICAL CARE.

SIR: May I be permitted space to comment on the recent article by Dr. K. J. Cullen on his midwifery practice at Busselton, Western Australia? He is to be congratulated on his sound appraisal of midwifery in general practice, and the reading of it should benefit all groups of obstetricians. The enthusiasm behind the preparation of his paper is all the more commendable because, coming as it does from a smaller country town, it lays stress on the fact that better results are within the range of all if sufficient care is taken to search out possible difficulties. Although his series of 300 cases is small, his combined stillborn and neo-natal mortality of less than half that expected should be very encouraging to him. His decision to send away complications for specialist management is sound, and on this score he strikes the very practical point of keeping one's vanity and personal pleadings of the patient in true perspective.

The problem of prematurity will so often have to be dealt with on the spot. To be successful, trained personnel are an absolute essential, so that all nursing sisters who may be called upon for this duty should endeavour to visit training centres in latest methods. The humid crib appears to be a most useful aid in management, and it is the intention in South Australia to distribute the proceeds of the Coronation Gift Fund in the form of humid cribs throughout this State.

His conservative attitude towards forceps deliveries is sound. So often, difficult forceps are man-made, either by attempting the application too early or badly assessing the question of disproportion, and it is sound teaching that advises the young graduate to wait a "little longer" in the absence of fœtal or genuine maternal distress. The more difficult the forceps operation, usually the less mature the obstetrician. As Dr. Cullen points out, with better antenatal training and healthier and happier patients entering labour, the lower the true forceps rate. This is the experience of teaching schools in Australia today.

His question regarding breech presentation is more relevant because they are more common. He would appear to be turning them too early, as his version rate is one in every five cases seen. Keith Vartan showed graphically that of 550 breech cases seen at twenty-five weeks only 18 failed to undergo spontaneous version by thirty-eight weeks. Therefore, none should be turned before thirty-two weeks and usually only *primiparæ* before thirty-four weeks. A note of warning should be sounded on external cephalic version being done frequently and particularly under general anæsthesia. So often the anæsthetic is an unnecessary inconvenience and risk and an opportunity for too strenuous efforts. The safest course to adopt for those not experienced in managing breeches is to try external cephalic version without anæsthesia, and in the presence of failure to have a most careful assessment of that case carried out by an obstetric specialist.

The toxæmia rate is low, and in my experience of country and city practices, the country rate is nearly always lower.

Dr. Cullen strikes the humorous note by his attempts at the role of the transgressor into the life of the dairy farmer, who so often works on the theory that Daisy works when she is in calf, and why not Madam?

Yours, etc.,
L. O. S. POIDEVIN,
Director of Obstetrics, University of Adelaide.

Adelaide,
October 28, 1953.

REHABILITATION AND RESETTLEMENT IN GREAT BRITAIN.

SIR: The report on rehabilitation and resettlement in Great Britain by Dr. B. G. Wade, published in your journal on October 3, 1953, emphasizes the serious deficiency in our own hospitals in this type of service. During the war years the services conducted convalescent depots, in which a happy blend of medical care, occupational and physical therapy and physical training resulted in accelerated return of sick and injured personnel to active service. In civil practice it is almost impossible to organize similar facilities for patients in hospital. Apart from the human values, there is a very good case to be made for the economic advantage to the community of such facilities.

The teaching hospitals should give a lead in this direction. No longer then would so many of our graduates have a defeatist attitude to chronic disabling illness. As Dr. Wade points out, many chronic sick suitable for this type of service suffer from medical illnesses or the effects of age. The direction of such services by orthopædic surgeons, as occurs in many centres, presupposes a breadth of interest in conditions outside their specialty which probably does not exist. It is considered that a more realistic approach would be to create within each such hospital a department of rehabilitation, which would have at its head a physician trained in the best overseas techniques, with staff and equipment adequate to the needs of the hospital. The work of such a department should be part of the student curriculum. Only in this way will the present deplorable state of this phase of treatment be rectified.

Yours, etc.,
SELWYN NELSON.

233 Macquarie Street,
Sydney,
October 26, 1953.

NEUROSIS IN GENERAL PRACTICE.

SIR: I was extremely interested and delighted in the article on neurosis in general practice by H. Owen Chapman in the September 12 issue of the journal. Ever since I commenced practice in Orroroo seven years ago I have cautiously felt my way in treating the neuroses by psychotherapy of various sorts and with gratifying success in most instances. The comparative ease with which many of these neuroses (often grossly disabling) can be cured has puzzled

and almost frightened me when comparing them with similar cases reported in text-books who have had months or years of psychoanalysis, but the general practitioner has a big advantage in already having established confidence and *rapport*, and Dr. Chapman's results and experience confirm my own. This article has further convinced me that the general practitioner is the person in the best position to treat these people.

In common with many others I find many psychiatric text-books difficult to read and understand, but this does not apply to "The Common Neuroses" by T. A. Ross, in which there is an excellent description of this work. As with all new methods, it is difficult to overcome the fear of the unknown when commencing, even though armed with knowledge, but having done this, the work is full of interest, and by virtue of the results obtained in allaying suffering, it is most satisfying. If after one or two interviews any difficulties are encountered, the case can be referred to a psychiatrist, and these interviews provide a valuable introduction as the patient may be told that the psychiatrist uses similar methods, and thus help to dispel the doubts and fears which the mere mention of a psychiatrist appears to engender in many minds.

Just as the patient with chronic cholecystitis is most eager and willing to have an operation after an acute attack, so the patient with an anxiety state is most cooperative when the symptoms are fresh in his or her mind, and this gives the general practitioner an added advantage.

The time involved is not great. Generally the primary conflict can be discovered in two or three interviews—seldom more than six—so that the time involved in treating a neurosis in general practice is little greater than that involved in performing an operation, but, of course, it is less lucrative.

If Dr. Chapman can get such good results when acting as a *locum tenens*, surely it should encourage other general practitioners to attempt to cure instead of merely telling the patients that they are suffering from "nerves" and employing placebos.

Yours, etc.,

M. G. JANSEN.

Orroroo,
South Australia,
October 30, 1953.

Royal Australasian College of Surgeons.

OPEN MEETING.

A MEETING of the Royal Australasian College of Surgeons will be held in the Stawell Hall, The Royal Australasian College of Physicians, 145 Macquarie Street, Sydney, on Wednesday, November 25, 1953, at 8.15 p.m. The subject will be "The Results of Treatment of Cancer of the Breast in the Teaching Hospitals". The speakers will be Mr. V. H. Cumberland, Mr. J. P. Fleming, Mr. W. J. Pullen, Mr. A. C. R. Sharp and Mr. J. W. Spence. This meeting is open to all members of the medical profession.

PRIMARY FELLOWSHIP EXAMINATION.

1. A PRIMARY EXAMINATION in anatomy (including normal histology) and applied physiology and the principles of pathology will be conducted in Melbourne in March, 1954.

2. The written papers will begin on Thursday, March 11, 1954.

3. The examination is reciprocal with the primary examinations for Fellowship of the Royal College of Surgeons of England, the Royal College of Surgeons of Edinburgh, the Royal College of Surgeons in Ireland and the Royal Faculty of Physicians and Surgeons of Glasgow.

4. Each candidate will be notified by post of the result at the termination of the examination.

5. The examination is open to graduates of not less than one year's standing of a medical school approved by the Council of the College for the purpose.

6. Candidates must submit evidence of their qualification and of the date of acquirement thereof.

7. Forms of application for admission to the examination may be obtained from the Secretary, Royal Australasian College of Surgeons, Spring Street, Melbourne.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED OCTOBER 17, 1953.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	15(3)	..	..	..	..	..	..	..	15
Amœbiasis	..	..	1	..	..	..	..	..	1
Ancylostomiasis	..	..	..	..	..	..	1	..	1
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	1	..	..	..	..	..	..	..	1
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	4(1)	4(4)	6(4)	..	..	..	2	..	16
Diphtheria	3(3)	2	..	..	1(1)	..	..	..	6
Dysentery (Bacillary)	..	..	1(1)	..	1(1)	..	..	..	2
Encephalitis	..	2	..	..	..	..	..	..	2
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	..	..	..	..
Infective Hepatitis	..	13(4)	..	..	4(3)	..	..	..	17
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	1	..	..	..	..	..	1
Leptospirosis	..	..	..	..	..	..	..	..	..
Malaria	..	..	..	..	..	..	..	..	..
Meningococcal Infection	5(4)	1(1)	1	..	1(1)	..	..	..	8
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	8(4)	4(1)	1	4(3)	..	1	..	..	18
Puerperal Fever	1(1)	..	2	..	..	..	..	..	3
Rubella	..	19(8)	..	..	46(41)	..	..	1	66
Salmonella Infection	..	..	..	..	..	..	..	..	..
Scarlet Fever	15(9)	27(16)	11(9)	2(2)	..	2	..	..	57
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	1(1)	..	..	..	..	..	1
Trachoma	..	..	..	..	..	..	..	..	..
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	30(21)	30(23)	8(5)	7(5)	8(6)	5	5	..	93
Typhoid Fever	3	..	..	..	..	..	..	..	3
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

8. The fee for admission, or readmission, to the examination is £15 15s. Australian currency (*plus* exchange on cheques drawn on banks outside Melbourne). The fee must be forwarded with the form of application so as to reach the Secretary at his office not later than January 28, 1954.

Naval, Military and Air Force.

APPOINTMENTS.

THE following appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 67, of October 29, 1953.

NAVAL FORCES OF THE COMMONWEALTH.

Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

Termination of Appointment.—The appointment of Charles Vaughan Phayre Ryall as Surgeon Lieutenant-Commander (for Short Service) is terminated, dated 22nd August, 1953.

Citizen Naval Forces of the Commonwealth.

Royal Australian Naval Reserve.

Appointment.—Stanley Henry Watson is appointed Surgeon Lieutenant, dated 21st August, 1953.

Royal Australian Naval Volunteer Reserve.

Appointments.—Morison Thwaites and Alastair Charles Cole (Sub-Lieutenants) are appointed Surgeon Lieutenants, dated 21st August, 1953.

AUSTRALIAN MILITARY FORCES.

Honours and Awards.

The Australian Efficiency Medal.—Captain VX114208 Lawrence Vivian Bradbury, Royal Australian Army Medical Corps (Medical) (now Reserve of Officers).

Congresses.

INTERNATIONAL HEALTH AND MEDICAL EXHIBITION, TURIN, ITALY.

SPONSORED by the *Minerva Medica* journal group and the Italian Medical Association, the second International Medical and Health Exhibition will be held in Turin, Italy, from May 29 to June 6, 1954. The exhibition will present an over-all picture of progress in medicine, surgery and hygiene as seen from scientific, technical and practical points of view. In addition there will be medico-surgical, pharmaceutical and veterinary meetings, as well as the second International Medico-Scientific Film Festival. Further information may be obtained from *Minerva Medica*, Corso Bramante 83, Turin, Italy.

Medical Appointments.

Dr. D. W. L. Parker has been elected a member of the Council of the University of Tasmania, in accordance with the *Tasmanian University Act*, 1951.

Dr. D. McL. Somerville has been appointed senior medical officer in the Division of Mental Hygiene, Department of Public Health, New South Wales.

Nominations and Elections.

THE undermentioned has applied for election as a member of the South Australian Branch of the British Medical Association: Lindon, Marten Edward, M.B., B.S., 1953 (Univ. Adelaide) (qualified 1952), 8 Prospect Road, Prospect, South Australia.

The undermentioned have been elected as members of the South Australian Branch of the British Medical Association: Hancock, John Owen, M.B., B.S., 1952 (Univ. Adelaide) (qualified 1951); McDonald, Hugh Thomas, M.B., B.S., 1953 (Univ. Adelaide) (qualified 1952); Pyne, Remington John, M.B., B.S., 1953 (Univ. Adelaide) (qualified 1952).

Deaths.

THE following death has been announced:

THOMPSON.—Charles George Thompson, on October 28, 1953, at Launceston, Tasmania.

NISBET.—Alwyn Tom Hays Nisbet, on November 5, 1953, at Sydney.

Diary for the Month.

Nov. 24.—New South Wales Branch, B.M.A.: Ethics Committee.
Nov. 25.—Victorian Branch, B.M.A.: Branch Council.
Nov. 26.—South Australian Branch, B.M.A.: Clinical Meeting.
Nov. 26.—New South Wales Branch, B.M.A.: Branch Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries: Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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